THE CHEMICAL AGE

VOL LVI 22 MARCH 1947 No 1445

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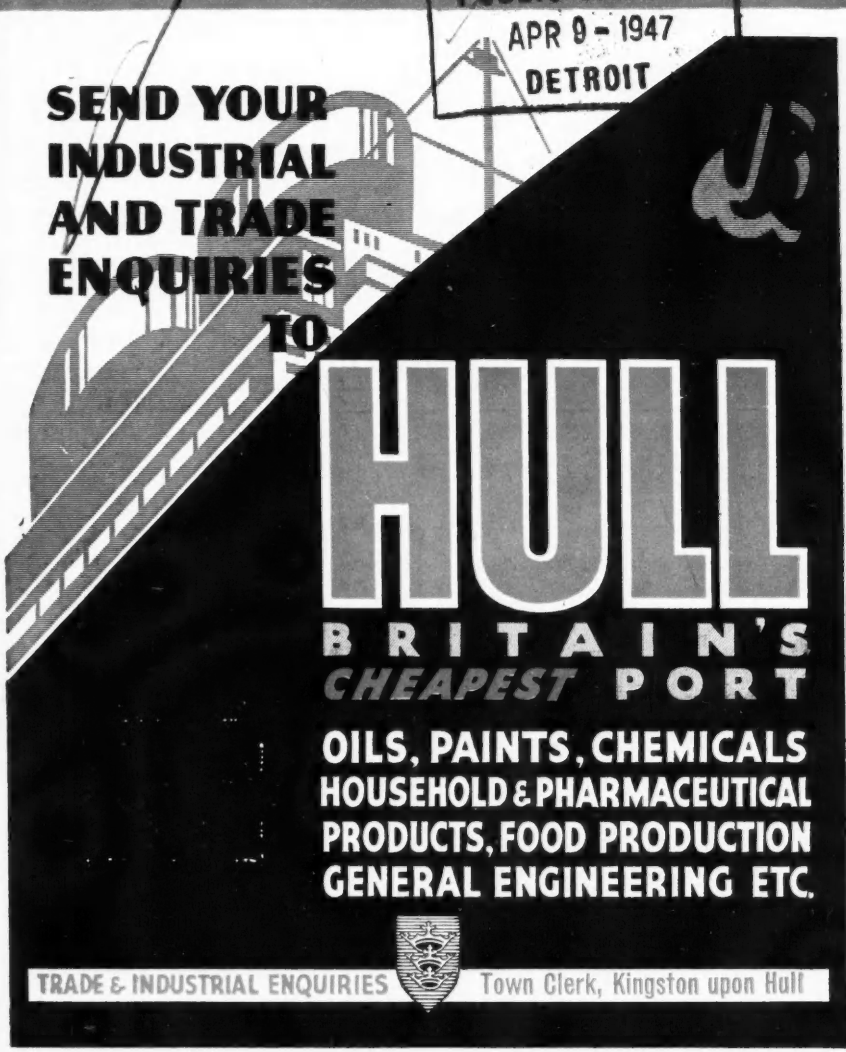
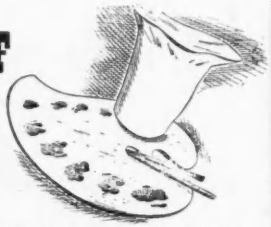


THE CHEF AND THE PALETTE



THE chef uses colour and composition like a painter. The bright colouring of maraschino and glacé cherries, blancmange powders, confectionery creams and icings comes from the approved colouring material, erythrosin, an iodine compound.

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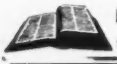
You are invited to consult the Iodine Educational Bureau. Its information on the uses and possibilities of iodine and its professionally qualified staff are at your disposal. There is no charge.



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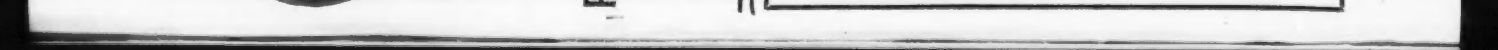

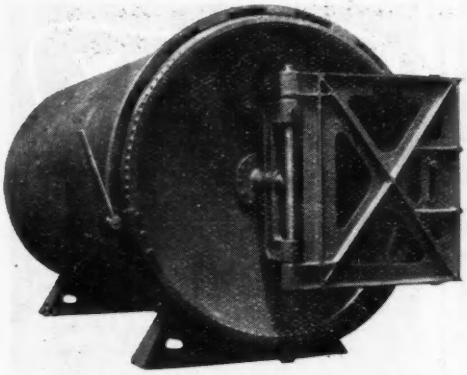

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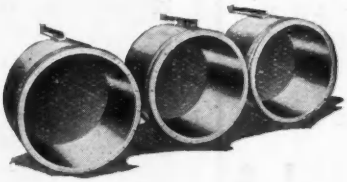

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INDEX TO ADVERTISERS
IN THIS ISSUE

	Page
Air Conditioning Corporation (Jeffreys) Ltd.	xviii
Alcock (Peroxide) Ltd.	ii
Allen, Athole, G. (Stockton) Ltd.	xiii
Angel, H. Reeve & Co., Ltd.	xii
Attwater & Sons Ltd.	xii
Automatic Coil Winder & Electrical Equipment Co. Ltd., The	xxiii
Baker Perkins Ltd.	xix
Barclay, Kellett & Co. Ltd.	Cover iii
Birmingham Battery & Metal Co. Ltd., The	xviii
Blackwell's Metallurgical Works Ltd.	xxv
Boome, Geo. F. & Son Ltd.	Cover ii
Bowmans (Warrington) Ltd.	xxv
Braby, Fredk. & Co. Ltd.	iii
British Steam Specialties Ltd.	xxv
Brough, E. A. & Co. Ltd.	xx
Callow Rock & Lime Co. Ltd., The	Cover iii
Discovery—Jarrold & Sons Ltd.	362
Dowson & Mason Gas Plant Co. Ltd., The	iv
Dryden, T.	xii
E.C.D. Ltd.	xx
Farnell Carbons Ltd.	xxviii
Feltham, Walter H. & Son Ltd.	xxv
Foster, Yates & Thom. Ltd.	i
Gallenkamp, A. & Co., Ltd.	ix
Glebe Mines Ltd.	iv
Greenwich Pump & Plant Co. Ltd., The	Cover ii
Hackbridge Electric Construction Co. Ltd.	vi
Harris, Frances, W. & Co. Ltd.	xxv
Hull, City of, Development Committee	Front Cover
Imperial Chemical Industries, Ltd.	361
Iodine Educational Bureau	Cover ii
Jenkins, Robert & Co. Ltd.	i
Jenkinson, W. G., Ltd.	362
Jobling, James A. & Co. Ltd.	ii
Kestner Evaporator & Engineering Co. Ltd.	viii & xxviii
Kilner, John & Son (1927) Ltd.	362
Laporte, B. Ltd.	xvi
Leeds & Bradford Boiler Co. Ltd.	xxviii
Leigh & Sons Metal Works	xxv
Lennox Foundry Co. Ltd.	xxv
London Aluminium Co. Ltd., The	vii
Lord, John, L.	Cover iv
May & Baker Ltd.	x
Metallurgical Chemists Ltd.	362
Mitchell, L. A. Ltd.	Cover iv
Nordac Ltd.	xxiv
Nottingham Thermometer Co. Ltd., The	xiv
Perry & Hope Ltd.	xxviii
Podmore, W. & Sons, Ltd.	xvi
Prodorite Ltd.	Cover iii
Pulsometer Engineering Co. Ltd.	xxiv
Reads, Ltd.	xxi
Shell Chemicals Ltd.	xxii
Siebe, Gorman & Co. Ltd.	Cover ii
Simon, Richard & Sons Ltd.	vi
Spence, Peter & Sons Ltd.	xiv
Swift & Coy. Pty. Ltd.	xvi
Thermal Syndicate, Ltd., The	v
Voss Instruments, Ltd.	xxv
Ward, Thos. W. Ltd.	xv
Widnes Foundry & Engineering Co. Ltd.	xvii
Wilkinson, James & Son, Ltd.	viii
Wilkinson Rubber Linatex, Ltd.	xi
Worthington-Simpson Ltd.	x
Yorkshire Tar Distillers Ltd.	xiv

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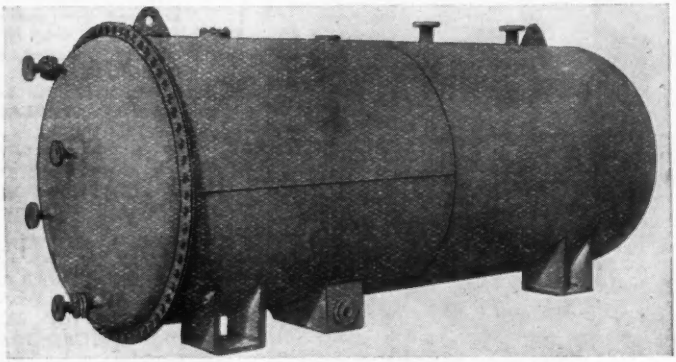

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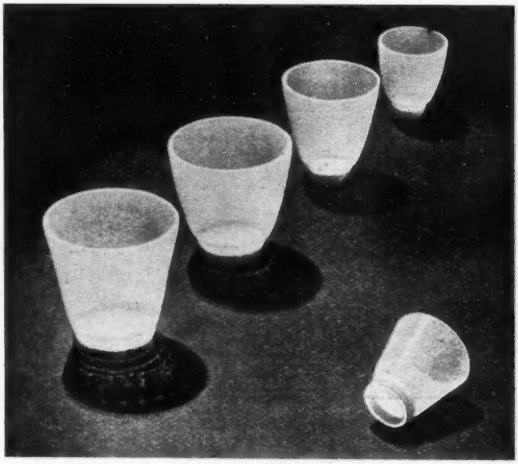

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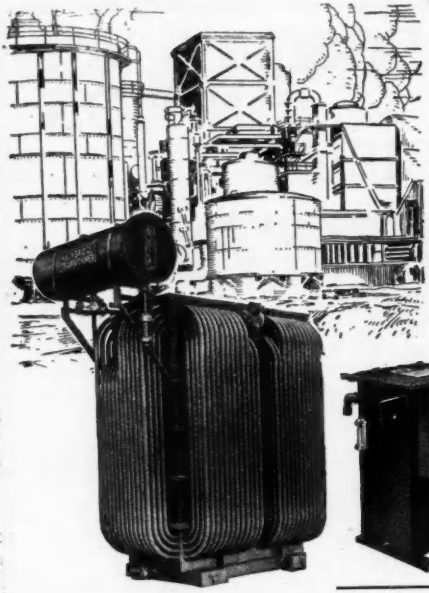

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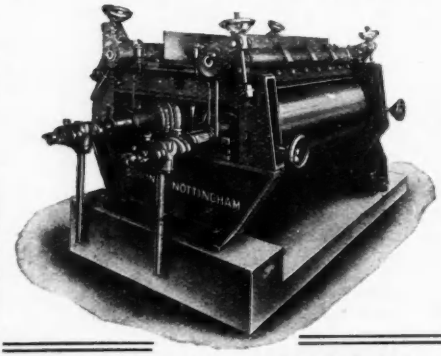

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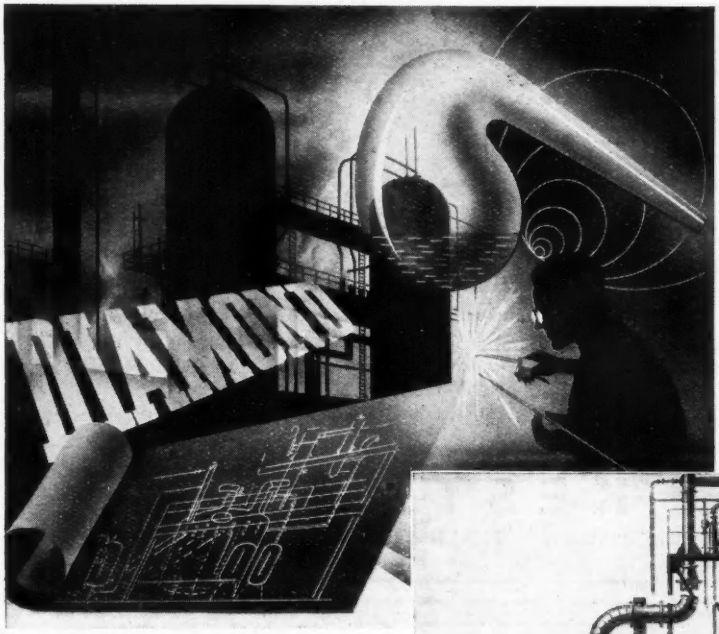

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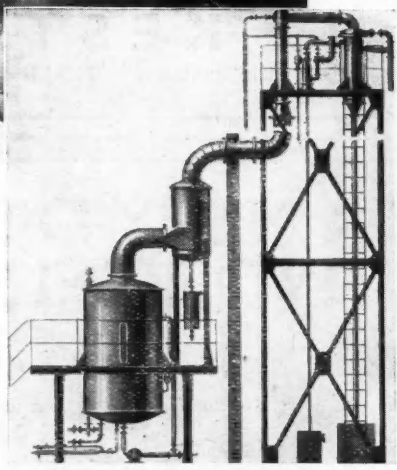

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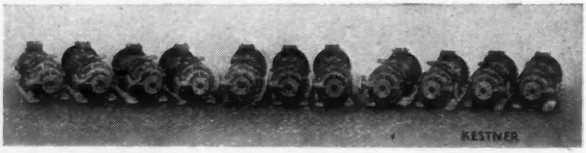

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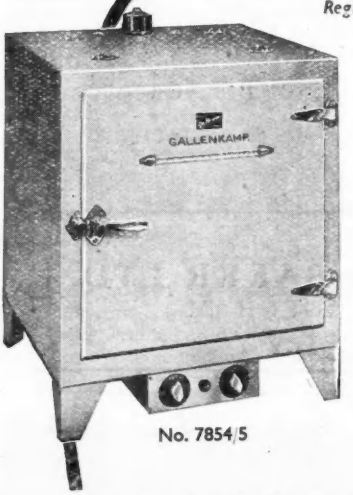

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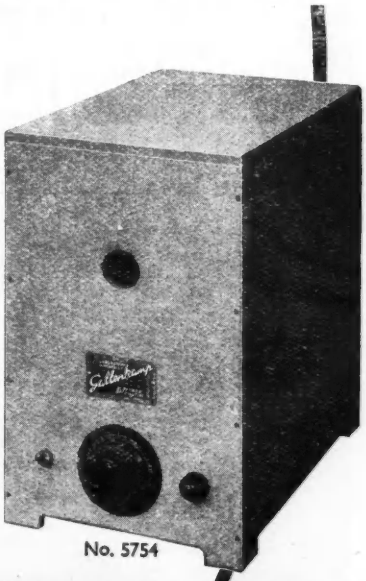

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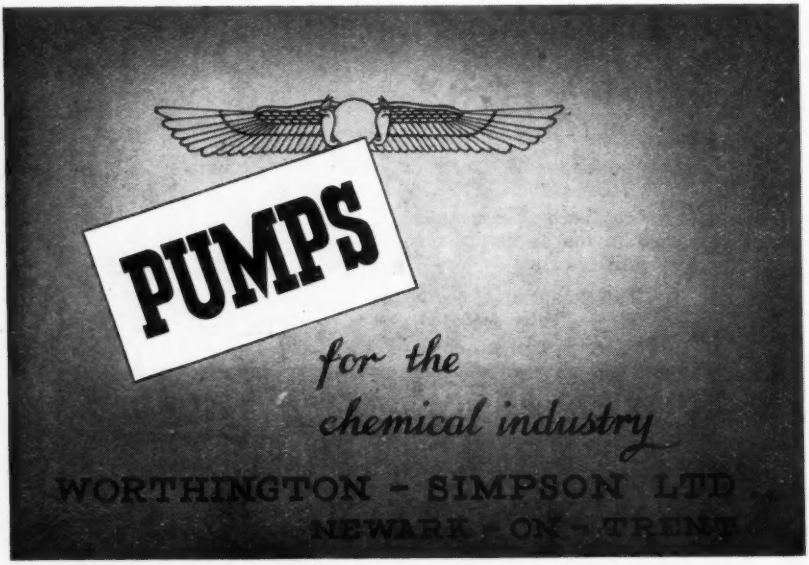

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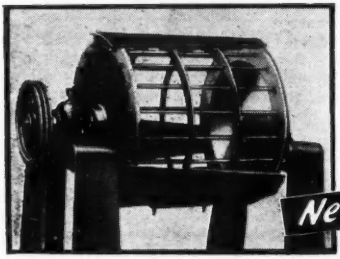

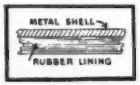

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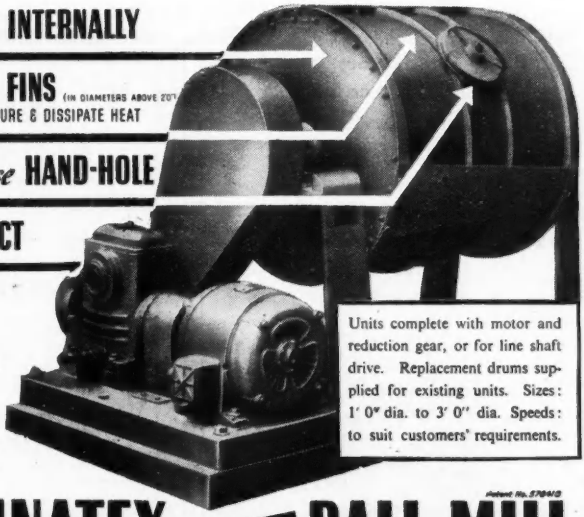

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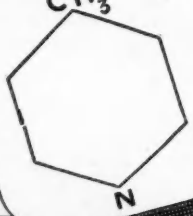

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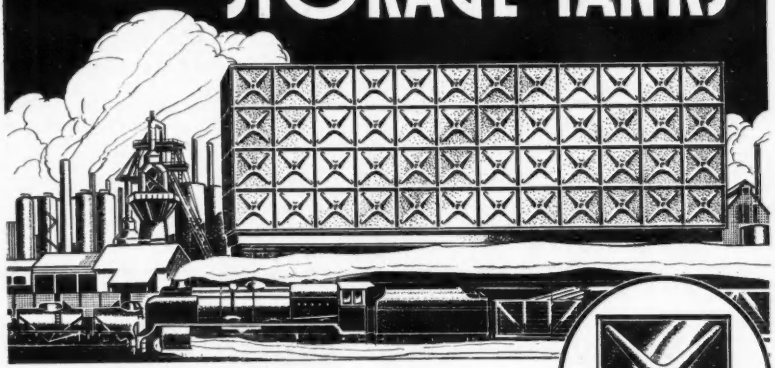

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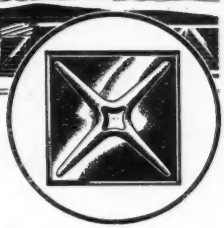

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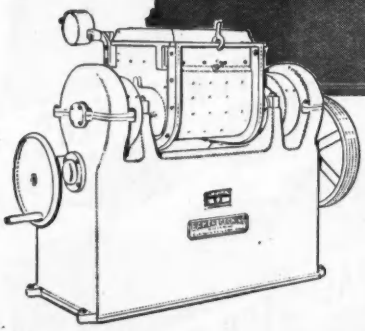

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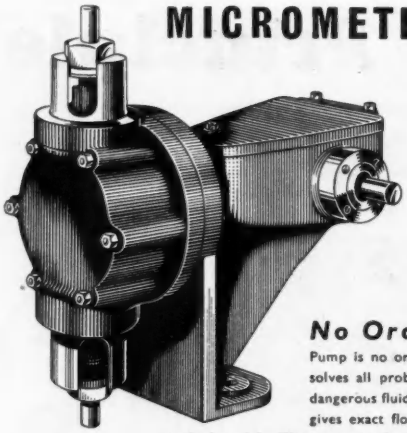

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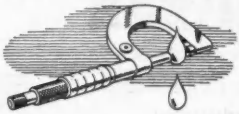

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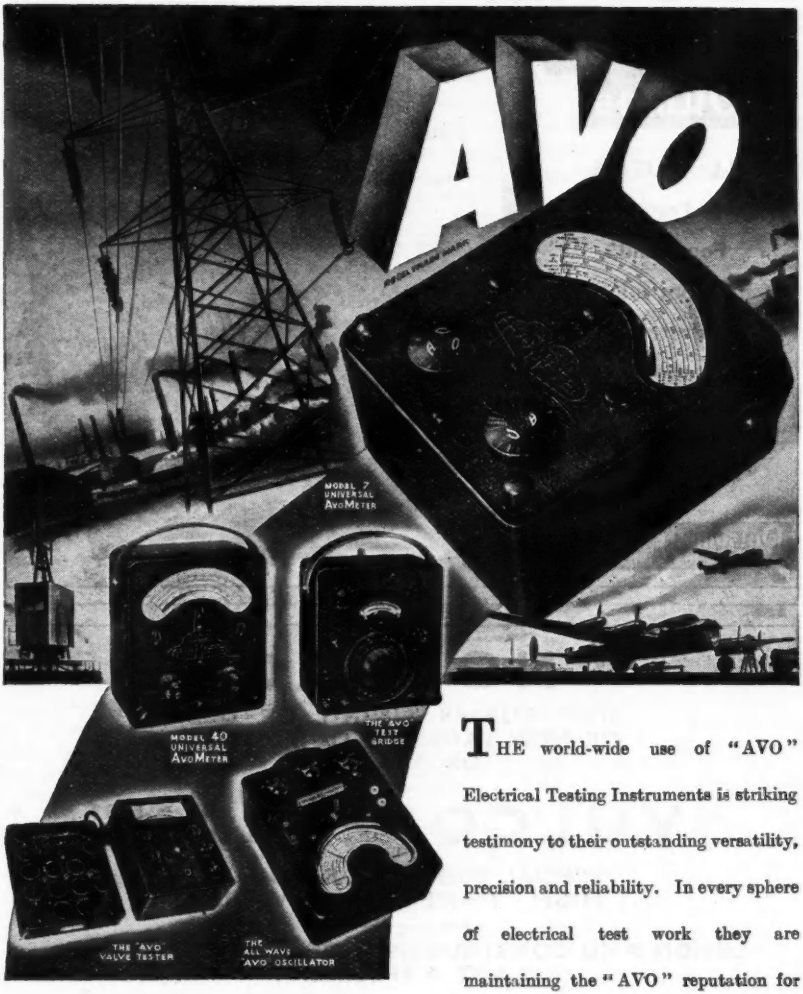

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22 March, 1947

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Resurgam

A WRITER in *The Times* has lately pointed out that when the American loan is exhausted this country will have to pay its own way once again and will then face an adverse balance as between income derived from trading with the world and payments for imports, etc. This adverse balance will be anything up to £335,000,000. As the American loan is likely to be exhausted for all practical purposes some time next winter, there is only one solution for the grave and difficult crisis that is so rapidly approaching. It is to increase the balance of exports over imports. *The Times*' correspondent calculates that " productivity for export, or else the proportion of production exported, should be increased by not less than one-third beyond the peak rate so far reached in order to ensure maintenance of the present standard of imports of food and tobacco."

One may detect a certain grim cynicism in the reference to tobacco, but that in no way masks the gravity of the perilous situation in which we have been placed by events. The long and the short of it is that we are "up against it." Whatever one may think of the White Paper, " Economic Survey for 1947," it at least tells us bluntly where we stand. That is to the good, for the British are always at their best when facing difficulties and perils. We shall rise again. Of that we have no doubts. We may be down but we are not out. We in this journal are optmistic, and there is ground for our optimism. It is based fundamentally on the character of our people. Once let them see clearly what faces them and they will face it. It needs not only the hard work and devotion of the working man and his wife; it needs equally boldness and courageous acceptance of risk and toil by those who control capital and who have the power to engage in great enterprises of the kind that made this country the greatest industrial nation in the world in the days of Queen Victoria. That courage is still to be found in industry is clear from announcements that appeared in THE CHEMICAL AGE last week.

The Government has chosen this juncture to divide the nation over the issue of nationalisation. Coal mining has been the first of the industries to be thus treated. The result must be to liberate for other purposes a great deal of capital, great skill in the management of commercial enterprises and no small volume of technical skill. To what use is this to be put? Those who have the capital could invest it in Government securities or in safe

On Other Pages

Electronic Drying of Penicillin	338
Scottish Chemical Production ...	338
Production of Alumina by the Lime-Soda Process	339
Czechoslovak Chemical Mission	343
Underground Gasification in U.S.	344
U.S. Seeks Raw Materials ...	344
Chemicals from Petroleum ...	346
Chemical Notes from S. Africa	350
French Coal and Power ...	351
German Chemical Industry ...	352
Potash Find	352
Parliamentary Topics	353
Obituary	354
Chemist's Bookshelf	355
Home News Items	356
Personal	357
Overseas News Items	358
Commercial Intelligence ...	359
Stocks and Shares	360

Trust Funds of other kinds, and sit back to take their income as gentlemen of leisure. They could also do the other thing. They could say that they still represented Private Enterprise and that if one door had been closed to them, many others were still open. The announcement of the plans of the Powell Duffryn organisation shows that all the best brains do not intend to be submerged in nationalised industries and that private enterprise is very much alive in Britain. And long may it remain so!

It is through private enterprise such as this that we shall fight our way back to safety and security. It is to private enterprise that we look for our future prosperity. All the vast and accumulated knowledge of fuel and mining, all the vast experience of managing the greatest industrial enterprises are to be put at the disposal of the industries of this country. The nationalisation of the coal mines may yet, for reasons quite unexpected by its authors, prove as memorable in the history of this country as did such events in the past as the persecution of the Flemish weavers who fled their native land to settle in this country bringing their knowledge and industry with them.

On the purely chemical industry side of the picture, we note with genuine delight the great enterprise for the manufacture of chemicals from petroleum by the Shell Company. We have long advocated that something of this sort should be set up in this country. We have pointed to the great enterprises in chemical manufacture initiated in the U.S.A. by the petroleum industry and we have asked that there should be more home refining of petroleum in this country in order that we should not be debarred from this market. Our chemical plant manufacturers, too, should be given the opportunity to design and manufacture the necessary plant so that they can gain that experience that will enable them to take their place among the great chemical plant industries of the world. The manufacture of chemicals in this country that up to now we import from abroad, the manufacture too of chemicals for export, more research in this country on chemical synthesis, all are of the greatest importance at this critical hour.

The economic position of this country is grave. There can be no mistake about that. If anyone knows that, it is the leaders of industry. They have their fingers on the pulse of world events; they can weigh up the chances. That two great companies of world renown and operating in every quarter of the globe should back their faith in Britain's future in this way proves beyond doubt that private enterprise is still enterprising. In spite of the scorn poured out in Left quarters upon the methods of capitalism and of business as conducted by individual, non-nationalised concerns, there is not the shadow of a doubt that if the spirit shown by these two enterprises is widely followed, Britain will remain undefeated yet, in economics as in war. Resurgam! Like the Phoenix, we shall indeed rise again from the ashes of war to the heights we had achieved in the days before the two wars forced upon us by the envious Germans caused us to dissipate our hard-earned treasure in order to defend ourselves. We are optimists. Even though two swallows do not make a summer we think we have reason for our optimism. The Giants of Private Enterprise have shown the way. It is for others, too, to back their faith in Britain in this way.

NOTES AND COMMENTS

CHEMICAL PROGRESS

AMID the wonder, terror and applause which seem to compose the popular feelings towards current scientific achievement is heard occasionally the small, cool voice of reason, whose observations have a more salutary effect than all the ballyhoo. It has been raised again recently, this time rather unexpectedly in America, by Mr. H. M. Corley, a chemist engaged in research for the Chicago meat packing company of Armour. Without seeking to belittle the great achievements of chemistry, he suggests that what has been done is but a tithe of the body of information remaining unexplored and does not support the view that the rate at which chemicals are being harnessed calls for any applause. Hydrogen, he points out, was known 150 years before it became commercially important, and magnesium, isolated in 1755, has been added to the

essential industrial metals only in the last two decades. These, of course, are only isolated examples from a long list of chemical substances which are "inert" only because their potentialities have never been sufficiently investigated. Ninety-seven per cent of the 300,000 known organic chemicals are still awaiting development by pioneers of chemical industry, Corley estimates, and of about 9000 currently useful items on the list not more than 5000 are being manufactured in the U.S.A.

RICH REWARDS

CLEARLY the field to be exploited contains undreamed-of riches and the characteristically American view that laboratory research should be devoted primarily to producing a precipitation of dollars is as likely to produce the desired result as the more academic approach. And, according to Corley, the function of the research chemist includes creating the demand as well as evolving means of reducing production costs to the point where new fields of usefulness are opened. Promotion of new chemicals must start in the laboratory, he says, and all possible physical and chemical data should be disseminated through the technical journals. Thus obstacles to new chemical applications will be removed, new consumers enlisted and the rewards of research will be sufficient to support a great body of pioneer work in new fields. Evidence that the financial inducements are well within reach is the recent phenomenal increase in profits of several American chemical companies. With the extension of the enterprising spirit animating the Shell Company's current project for wide production of chemicals from petroleum the same results can be achieved here.

Studious One: ***Scientists are now working on pickling liquors.***

Sporty One: ***I don't blame them. I work better on beer, too!***

TRANSPORT "REPRIEVED"

THE most welcome event in Parliamentary affairs in recent months—some will say the only one—was the decision last week announced by the Minister of Transport not to proceed for the time being with the clauses of the Transport Bill dealing with C licences. It is the earnest hope of all who are acquainted with the facts that he never will attempt to revive a measure which, whatever the long-term results, promised to produce a chaotic interruption of one phase of industrial activity at a time when such a risk could least be afforded. According to the evidence of the British Road Federation, 150,000 industrialists and traders running 306,000 vehicles would, had this clause been retained, have been so restricted in the use of their own wagons that their continued operation would probably have ceased to be economically worth while. The perimeter of 40 miles to which they were to be restricted would have meant that very few heavy transport wagons could have completed their accustomed deliveries and the re-allocation of trucking between works and State transport would have provided a transport managers' nightmare of uncertain duration. Two factors have made the projected measure especially objectionable. The first was the rigid time schedule for the concluding stages of the Bill which would have prevented any adequate expression of the very strong opposition of the C licence holders, which had been denied ventilation at a public inquiry; the second the sinister indications that the Government's intentions towards the road operators was of the same degree of benevolence as the Carpenter's towards the Oyster. There was no restriction to prevent the Government controlled transport from forcing the commercial wagon off the road by economic pressure. Those are the immediate threats which have been averted and the satisfaction felt by the people most concerned will be shared by all who are not so obsessed by the hypnotic spells of nationalisation as to be unable to applaud the first evidence that the Government's actions are still capable of some control by pressure from outside Parliament.

Electronic Drying of Penicillin

A METHOD for drying penicillin on a production basis by electronic high-frequency heating has been developed. The process makes possible the production of ready-for-use ampoules of dry penicillin at the rate of 200,000,000 Oxford units per hour from a single R.C.A. installation, which is a great deal faster than the conventional "freeze-drying" method. Since ordinary heat methods destroy the effectiveness of penicillin, bulk-reduction of penicillin solution and the final drying process had been accomplished through the use of dry ice and high vacuum at below freezing temperatures. The R.C.A. scientists discovered that in a moderate vacuum they could boil and evaporate the solution at 50° F.—a temperature that does no harm to the drug during its brief period of exposure.

When the vacuum was applied to the 20 c.c. bottles containing 1 c.c. of concentrated penicillin solution, the liquid foamed and much of it was lost. This appeared to be an insurmountable obstacle for a while. Then it occurred to those experimentors that revolving the bottles at a speed high enough to cause the liquid to form a thin layer around the walls of the bottle might solve the problem. Such a rotator was designed which not only worked but caused the thin layer of liquid to evaporate much faster than anticipated. They next built a vacuum chamber and placed in it 34 rotators that could spin up to 3000 r.p.m. They used three metal belts between the circling rows of the rotators as electronic plates and caused radio-frequency current to flow between the plates.

A revolving table was designed with six of the unique radio heat chambers on top of it in such a manner that three of the chambers could be exposed to the current at one time. The table turns 60° at one-minute intervals, thus giving each of the 34 ampules of penicillin in the chambers three minutes of current and at the same time allowing for the unloading and loading process as the chambers make the circuit. This electronic turntable has a potential output of 200 ampules per hour, with each of the ampoules containing the standard of 100,000 Oxford units of the drug, for a total of 200,000,000 Oxford units per hour. This is sufficient for 10,000 normal doses.

It was discovered that, for perfection in drying, however, additional heating was necessary. This is achieved through the use of electrically heated domes into which the vials may be placed in aluminium castings containing 102 each. In one hour the entire process is completed. The whole unit works on a push-button arrangement and may be started or stopped at will without endangering the drug under process. But its great advantages are that it affords continuous production at a fixed rate, needs only a fraction of the floor space required by the conventional freeze-drying systems, and operates at much lower cost.

Scottish Chemical Production

Scientific Workers' Appeal

THE quest for indigenous raw materials in the United Kingdom, lately the subject of questions in the House of Commons, is receiving active attention in Scotland from the Association of Scientific Workers whose Scottish Area Policy Committee has drafted a letter to be forwarded by the Scottish T.U.C. to the Secretary of State for Scotland urging that greater facilities should be provided in Scotland for the development of Scottish raw materials on the spot.

The committee rejects the argument of Mr. J. Westwood that adequate research facilities exist in England, claiming that most of the organisations now concerned with the development of raw materials are advisory bodies and that disappointing results were to be expected without a first-class research body in Scotland.

Among the various fields in which they consider research would be profitable is the application of Scottish limestones for potential use in the manufacture of calcium carbide. "The vital importance of carbide in a modern chemical industry is widely recognised, and Scotland has a unique opportunity of fostering this great electro-chemical industry in the Highlands."

Other suggestions are for research into Scotland's sand resources, which would "justify the establishment of a Scottish building research station," functioning within the general organisation, and for the development of research into chemurgy—the chemical processing of agricultural and forestry products, such as straw, heather, wool, sawdust, etc.

Sweden's need of chemicals, non-ferrous metals and machinery will figure in trade discussions which began in London on Monday between Swedish and British officials. The principal British requirement is timber. The effect of the recent ban by Sweden on imports of non-essential articles will also be examined. The Swedish delegation is led by M. Hammarskjöld, of the Ministry of Finance.

PRODUCTION OF ALUMINA BY THE LIME-SODA PROCESS—III*

Acid and Alkaline Processes

by W. E. PRYTHERCH, M.Sc., F.R.Ae.S.; M. L. R. HARKNESS, B.Sc., and W. D. SPENCER, Ph.D., F.R.I.C.

THE conventional method of producing pure alumina suitable for electrolytic production of aluminium known as the Bayer process uses a raw material containing less than 3 per cent silica, which limits it to high grade bauxites for economic operation.

In order to conserve supplies of bauxite during the war, aluminium producers were forced to utilise lower grades or ores and residues containing higher silica content. Operation of the Bayer process using siliceous ores is relatively uneconomical owing to the loss of soda, since during digestion of the bauxite with concentrated caustic soda under pressure, an insoluble sodium aluminium silicate is formed which carries soda and alumina into the red mud, with formation of a compound thought to be $Al_2O_3Na_2O.3SiO_2.9H_2O$. For every pound of silica 1.1 to 2.0 lb. of alumina and 1.1 to 3.0 lb. of soda are lost.

The purity of the alumina is important, since during the process of reduction, impurities present in the alumina are reduced simultaneously. Thus the purity of the aluminium prepared depends primarily on that of the alumina so that every effort is made to ensure a high degree of purity. There is an economic and a practical limit, however, and the normal composition of Bayer alumina is approximately as follows:

Al_2O_3	99.15 per cent
SiO_2	0.06 ,, ,,
Fe_2O_3	0.02 ,, ,,
Na_2O	0.40 ,, ,,
Ignition loss	0.37 ,, ,,
H_2O	—
TiO_2	—

The physical properties of the alumina are also important. The specific gravity should be greater than 3.8, and this can be attained by calcining to a sufficiently high temperature to ensure complete conversion from the γ to the α crystalline form. The temperature of calcination is normally taken to be 1350°C.

Alternative raw materials containing a large percentage of aluminium are widely distributed and plentiful, but they usually contain silicon and iron oxides in proportions that make them unsuitable for use in Bayer plants. Attempts have, therefore, been made to develop alternative methods. In America, for instance, a great deal of research work, encouraged by the Government, has been carried out and now several pilot plants are operating using various processes.

Judging by the spate of literature on the subject, the Russion Government is also very much concerned with the extraction of alumina from ores such as alunite, sillimanite, kyanite, andalusite,† coal ash, blast furnace slag and shale. Many suitable raw materials are found in England, the most important of which are low-grade bauxites, china clay, shale and boiler ash. A process worked out for one of these raw materials would be applicable in a modified form to the others. The compositions of these materials resemble each other, although the actual compounds present may vary considerably.

The literature on alumina production has reached vast proportions during recent years. This subject up to 1930, is described in the "Aluminium Industry" by Edwards, Frary and Jeffries.

Methods of extracting alumina may conveniently be divided into two main groups, depending on whether the extracting medium is acid or alkaline. Owing to the fact that raw materials dealt with seldom contain more than 40 per cent alumina, the process—to be successful—must operate at a very high bulk efficiency. Low yields are usually due to the fact that alumina is not present as such, but as complex insoluble, unreactive compounds, *e.g.*, aluminium silicates. The other problem results from contamination of the alumina. If acid attack is used the siliceous compounds remain undissolved and the aluminium and iron compounds go into solution together. Aluminium and iron oxide having very similar properties, tend to be precipitated together and thus a process of separation must be resorted to which adds to the complexity and cost of the process.

On the other hand, if alkaline attack is employed, the iron compounds remain insoluble and the siliceous compounds pass into solution with the alumina, and the problem resolves itself into the separation of silica and alumina. The permissible limits of impurities in alumina are not more than 0.02 per cent iron oxide and not more than 0.1 per cent silica, thus it will be

* Previous articles appeared on January 25 and February 8, 1947.

† Andalusite, sillimanite and kyanite are different crystalline forms of Al_2O_3. The main deposits are to be found in California, Eastern U.S.A., India, Assam and Norway.

obvious that the problem of removing these impurities is not an easy one, since the tolerances are so very low.

Acid Processes

1. **Sulphuric Acid.**—The acidic processes will now be discussed. These processes have been tried out primarily in conjunction with kaolin.

Using sulphuric acid it is difficult to produce alumina of suitable purity for the manufacture of aluminium. The American Bureau of Mines[18] claims to have developed a process whereby clay is leached with sulphuric acid and an impure concentrated solution of aluminium sulphate is obtained. A suitable reagent precipitates from this solution relatively pure aluminium sulphate which is filtered off, dried and calcined to give pure alumina. The reagents are recycled.

It has also been proposed that ashes of Moscow coal be treated with sulphuric acid to recover alumina.[19] The coal is said to contain 20 per cent ash which has the following composition:

Table 24

Al_2O_3	35.8 to 39.9 per cent
Fe_2O_3	7.5 to 11.5 ,, ,,
SiO_2	45.6 to 48.8 ,, ,,
CaO	1.6 to 5.9 ,, ,,
MgO	0.3 to 0.8 ,, ,,
SO_3	0.3 to 1.6 ,, ,,
Ignition loss	0.3 to 1.8 ,, ,,

The reaction is carried out at 250°C. to 300°C., the solution is evaporated to crystallising point, the crystals re-dissolved in water and filtered through activated pyrolusite to free them from iron, concentrated and calcined. This process has been found to be practicable in the laboratory but has not, so far as we know, been tried out on a large scale. The yields and degree of purity of the alumina obtained are not given. They state than an alkaline method of dealing with this coal ash is to be preferred.

A process for treating Aktash agalmatolite of the following composition has been described.[20]

Table 25.

Al_2O_3	40.69 per cent
SiO_2	42.98 ,, ,,
Fe_2O_3	1.06 ,, ,,
CaO	0.75 ,, ,,
MgO	0.47 ,, ,,
Na_2O — K_2O	2.03 ,, ,,
Ignition loss	11.98 ,, ,,

The ore is heated for two hours at 550°C., and then treated with a slight excess of sulphuric acid (density 1.51) on a water bath for five hours. The residue is filtered and the alumina precipitated with ammonia. It is claimed that the silica content of the alumina is less than 0.04 per cent, and that good yields are obtained. That this method is successful is due to the low iron content of the ore.

A method of treating refractory clays with sulphuric acid is described by Terpugov.[21] The clay has the following composition:

Al_2O_3	29.68 per cent
Fe_2O_3	5.4 ,, ,,

and is calcined at 650°C. before treatment with steam and sulphuric acid (50° Be). The solution is then neutralised with lime when aluminium sulphate crystallises out. Yields of 91 per cent alumina are claimed.

Hyslop[22] describes a method by which roasted clay is treated with concentrated sulphuric acid, the residue filtered off and calcium carbonate added to the solution. The mixture of calcium sulphate and aluminium hydroxide so formed is heated to give tricalcium aluminate, which is mixed with sufficient clay, calcium carbonate and sodium carbonate to give sodium aluminate and dicalcium silicate as a clinker on calcining at 900° to 1300°C. The clinker is then leached with water and alumina precipitated in a known manner. This is, of course, the lime-soda process superimposed on the sulphuric acid process and seems unnecessarily complicated and expensive, since as will be shown later in this article, the lime-soda process works well using clay directly.

It would appear that acid extraction using sulphuric acid is not attractive, except perhaps in the case of very exceptional raw materials such as Aktash agalmatolite.

2. **Ammonium Sulphate.**—Fusion with ammonium sulphate seems to be the most promising of the acidic methods for extracting alumina and it is understood that a pilot plant is operating in the U.S.A. using the ammonium sulphate exchange process. A mixture of pulverised clay and ammonium sulphate is heated at 400°C. in a rotary kiln. Ammonium aluminium alum and ammonium carbonate are formed. The mass is then leached at 100°C. with very dilute sulphuric acid, the residue filtered off and the solution crystallised. The alum crystals are refined by recrystallisation and then dissolved for use for precipitating aluminimu hydroxide. The alum solution is treated with ammonium carbonate, formed in the first step, to precipitate aluminium hydroxide, which is filtered off and ignited to yield alumina and ammonium sulphate, the latter being concentrated and re-cycled. This process can be improved by applying an initial step (an expired patent by M. Buchner) of heating the solid ammonium sulphate to drive off ammonia and convert the sulphate to bisulphate. The clay is then treated with this fused bisulphate at 200°C. in a digester and the resulting slurry of ammonium sulphate, ammonium iron sulphate and insoluble material is added to an excess of hot saturated solution of ammonium sulphate and filtered. On cooling, the ammonium alum is precipitated and the

iron salts remain in solution. The construction of a semi-commercial plant to use this process has been authorised by W.P.B.

Three British patents [23] held by English Clays, Lovering Pochin & Co., Ltd., describe processes involving the use of $(NH_4)_2SO_4$ which is very similar to the one in use in America. They stress the importance of having the iron present as ferrous sulphate and add a reducing agent to the aluminium sulphate solution, such as sulphur dioxide, to ensure this, and they then claim that iron free alum can be crystallised from the solution.

3. **Sulphur Dioxide.**—Budmika and Rivlin[24] have described a process whereby clay is roasted at 700° to 800°C. and then repeatedly extracted with sulphur dioxide at 85°C. at atmospheric pressure. They claim that 95 per cent of the alumina is rendered soluble in this manner. Once the alumina has been dissolved by means of sulphur dioxide the process is similar to that described under the ammonium-sulphate fusions, since the problem becomes one of separating pure alumina from an impure solution.

In the Goldschmidt process, worked out in Germany, calcined china clay is treated with dilute sulphurous acid. About 85 per cent of the alumina dissolves, and a solution containing 2.5 per cent alumina, 0.14 per cent iron oxide and some silica results. A monobasic aluminium sulphite ($Al_2O_3.2SO_2$) is separated by heating, while maintaining the SO_2 content of the solution at a minimum of 2 molecules SO_2 to 1 molecule of Al_2O_3 as the crystalline salt separates. The aluminium sulphite is calcined to give alumina containing 0.58 per cent Fe_2O_3. A supplementary purification is necessary, the Al_2O_3 being re-dissolved in sulphurous acid and again separated as the monobasic sulphite. This reduces the yield of the process, which amounts to 77 per cent of the alumina contained in the clay.

4. **Alkaline Earth Sulphates Plus Carbon.**—A patent held by Bitterfeld[25] claims that good results can be obtained on bauxite, alunite and other materials by sintering with a mixture of sodium sulphate and carbon at a temperature of 1300°C. The ratio of alumina to soda to carbon is 1 : 1.1 : 4, and lime or calcium sulphate is also added in such quantity that there are two molecules of lime to one of silica. The reducing furnace is a rotary type, and the reaction is carried out in three zones. The first zone is between 600°C.-700°C. and is slightly oxidising, the second up to 800°C.-1000°C. is neutral, and the third up to 1200°C.-1300°C. is reducing. At 800°C.-1000°C. the material is brought into contact with the reducing agent and steam or carbon dioxide. In the first zone most of the SO_2 is evolved. The final reduction should occur only above 1000°C. in order to exclude the formation of sodium sulphide. Once the alumina has been rendered soluble, the standard procedure can be applied. Good yields of pure alumina are claimed.

5. **Kalunite Process.**—This process has been used on alunite $(K_2SO_4.Al_2(SO_4)_3\ 4Al(OH)_3$ in U.S.A. with very successful results, and a plant is now in operation.

The ore is previously roasted at 550°C. It is then cooled to 200°C. and treated with a solution of potassium sulphate containing 10 per cent sulphuric acid. The extraction is operated by countercurrent leaching and an excess of alunite maintained so that no free acid is present. The residue is filtered off and normal potassium alum crystallised out. These crystals are washed, dissolved in dilute potassium sulphate solution and treated in an autoclave at 200°C. The potassium alum is broken down to a basic alum plus sulphuric acid and potassium sulphate. This is then leached with hot water to remove soluble potassium sulphate and leave the alumina behind. The process, slightly modified, is said to be applicable to clays, shales and other aluminiferous materials.

6. **Sulphides.**—The Haglund process involves smelting an aluminiferous ore with a charge containing a sulphide to form an alloy of iron and other impurities, and a slag composed principally of alumina and aluminium sulphide. The sulphide is decomposed by water to give aluminium hydroxide and hydrogen sulphide.

Cameron[26] describes a method of breaking down aluminite by heating with sulphur and carbon (or alkali sulphides) to produce alkali aluminate and excess alkali. After leaching, the gases from the roasting process can be utilised.

7. **Nitric Acid.**—Calcined clay is decomposed in iron-chromium-nickel crucibles with nitric acid under slight pressure. If care is used the solution will be free from chromium, iron and titanium.

Crystals of aluminium nitrate are produced by crystallisation. Aluminium nitrate is heated by passing over steam at 300° to 400°C. At 148°C. nitric acid and steam come off which are then condensed, 90 per cent of the nitric acid being recovered in this manner. The alumina produced by this process is said to be particularly reactive and is very suitable for the production of aluminium by electrolysis.

Alkaline Extraction

1. **Pederson Process.**—This process involves smelting a mixture of bauxite, iron ore and lime to produce a molten calcium aluminate slag, which is extracted with a 3 to 8 per cent sodium carbonate solution. This process has been used commercially in Norway. Difficulty is experienced in producing alumina free from silica.

It is claimed by Seailles and Dyckerhoff[27] that good yields of pure Al_2O_3 can be

obtained by fusing aluminiferous materials such as bauxite, clay, shale, metallurgical slag, ash and coal-bearing rocks, provided the conditions are carefully controlled. The alumina is converted to calcium aluminate, which is dissolved in water to give pure alumina, the silica having being rendered insoluble as dicalcium silicate. The fundamental rule is to add sufficient lime to form monocalcium aluminate, dicalcium silicate, dicalcium ferrite and then 10 per cent excess. The calcination temperature is quoted as 1400°C.-1450°C. and the time 30-45 min. Yields of 92 per cent alumina are claimed and the degree of purity of the alumina is said to be sufficient for the production of aluminium.

2. **Lime-Soda Process.**—This process, sometimes known as the Deville-Pechiney process, depends on the fusion of a mixture of aluminiferous ore, sodium carbonate and lime at a high temperature. The silica combines with the lime to form dicalcium silicate and the alumina is converted to sodium aluminate. The mixture is then leached with water and the sodium aluminate goes into solution. Alumina can be recovered by seeding or precipitation with carbon dioxide. It is sometimes stated that this process is only successful on low silica bauxites[28] but this is incorrect.

Much attention has been given to this process in recent years both in America and Russia. Lime-soda sinter units are being built in America to operate on red mud in conjunction with Bayer plants. It is stated that the sodium aluminate solutions so produced must be subjected to a pressure treatment to remove silica. They also claim to precipitate pure alumina by carbonating under carefully controlled conditions to hold up the small amounts of silica present in the sodium aluminate solutions[29]. These plants have been designed to deal with materials containing up to 15 per cent silica.

It is claimed by Treadwell and Schneeberger[30] that 68 per cent of the alumina present in kaolin can be rendered soluble by sintering a mixture of 3 gram molecules soda, 5 gram molecules calcium carbonate, and 1 gram molecule kaolinite at 850°C. Larger quantities of soda and calcium carbonate tended to promote the formation of insoluble alumino silicates and polysilicates.

A comprehensive booklet[31] on the production of alumina from Kansas Clay by the lime-soda sinter process, giving full experimental details, shows that yields of alumina of the order of 75 per cent can be obtained containing 0.40 per cent lime and 0.15 per cent silica, at a reasonable cost.

In Russia this method is preferred for extracting alumina ashes of the Moscow district coal, but it is stated that it is necessary to subject the sodium aluminate solution to a de-silicating process.

Numerous refinements of this process have been proposed.

A patent taken out by Folgen[32] deals with this process in detail. He states there should be two molecules of lime to each molecule of silica and 1.7 molecule sodium oxide to each molecule of alumina. The charge can either be introduced into the furnace dry or in the form of a wet slurry and is heated to 1150°-1400°C. The charge is then ground and leached with water or any suitable solution. He then subjects the solution to a de-silicating process, if necessary, and precipitates the alumina according to the Bayer method of seeding. The residues are said to be suitable for use as Portland cement.

Ralph Sherwin[33] prefers to use about half the amount of soda in the fusion mixture and to leach the charge with a sodium carbonate solution. This means that during the treatment of the sodium carbonate solution it is only necessary to evaporate part of the solution to dryness to recover solid sodium carbonate, which makes the process cheaper to operate. He recommends leaching at 180°F. to 212°F., and subjects the sodium aluminate solution so produced to a de-silicating process, which consists of heating for two hours at 290°F. at a pressure of 40 lb. per sq. in. above atmospheric pressure. The silica is then precipitated and can be filtered off.

Pasche[34] claims that alumina can be produced from clay, slate or blast furnace slags by fusion with sodium carbonate. The yield of alumina was 66 per cent when $Na_2O : Al_2O_3$ was 3, while minimum solubility of SiO_2 remains at 2.5 per cent as long as $Na_2O : Al_2O_3$ is less than 2.5. The best results were obtained from raw materials where $CaO : SiO_2$ and $Na_2O : Al_2O_3$ were 1.8 to 1.9, giving a 60 per cent yield of Al_2O_3 containing 2.5 per cent SiO_2. The sintered material was leached with hot water and the resulting aluminate solution converted to alumina. In our opinion the high silica content of the product was probably due to this hot water leaching. The leached residue was a kind of blast furnace cement containing 7 per cent alkalis.

3. **Benefication of Bauxite.**—It has been suggested that low-grade bauxites might be subjected to a gravity or flotation separation in order to remove silica and thus render the ore suitable for treatment in a Bayer plant. This process has been developed by the Bureau of Mines using 15 per cent silica tolerance as a standard division.

In the Mocambique area[35] a low-grade bauxite was greatly improved by preliminary grinding and washing with subsequent flotation using copper sulphate, as shown in Table 26.

Table 26

	Natural Ore	*Ore after treatment*
Al_2O_3	48 per cent	56 per cent
SiO_2	12.6 ,, ,,	8.5 ,, ,,
Fe_2O_3	11.6 ,, ,,	10 ,, ,,

Numerous references are appearing in the literature at the moment dealing with the flotation of silica.[36 37 38]

Miscellaneous

1. It is stated by Sturbelle[39] that in Belgium in 1930 ferrosilicon and alumina slag were produced in one operation, the slag disintegrating, on cooling, to a fine powder suitable for leaching with sodium carbonate. The aluminium ferro-silicon was produced from low-grade bauxite. He claims that full experimental details are in the hands of the American War Production Board.

2. **Improvements of blast furnace slag.**—By careful operation of a blast furnace it is possible to produce high alumina slags.[40] The silica content of the raw materials should be kept at a minimum and a small quantity of magnesium oxide added. The fuel used should not contain sulphur. During cooling of the slag the necessary conditions for complete crystallisation should be provided. It was found that optimum amounts of alumina which are obtained from synthetic slags (containing 5 to 7 per cent silica) can also be obtained from blast furnace slags.[41] A lower recovery of alumina from blast furnace slags than from synthetic slags is attributable to the structure of blast furnace slags, which cool more rapidly and less uniformly during pouring. The pouring of the slag in sections approximately 500 cm. thick increases the yield of alumina by 30 to 40 per cent.

3. An ingenious method for the production of alumina from kyanite ($Al_2O_3.SiO_2$) has been developed in Russia.[42] Extraction of alumina from kyanite directly is impossible even with preliminary heating. It was found possible to decompose it by adding it to the mixture during the thermal distillation of phosphorous from apatite, the kyanite being converted to anorthite ($CaO.Al_2O_3.2SiO_2$) which is readily soluble in acids.

This survey of the literature is, of necessity, brief and far from complete, but it should be sufficient to indicate the lines along which efforts to utilise low-grade ores for the production of pure alumina have been directed. Some of the more important papers have been discussed, and lead us to the fact that of all the methods attempted, the lime soda sinter process seems to be the most promising.

(To be continued)

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Czechoslovak Chemical Mission

A Czechoslovak Chemical Mission is arriving in London on March 14 for a ten days' visit to the British chemical industry. The mission is headed by the Director-General of the Czechoslovak Nationalised Chemical Industries, Dr. J. Martinek, with his Deputy Dr. Tichy, who is in charge of the oil refining industry and the Stalin Works, the largest gasification and hydrogenation plant in the world; Colonel Dr. V. Ettel, an expert on chemical warfare, now managing director of the Allied Chemical and Metallurgical Works (National Undertaking), which is one of the largest Central European chemical combines; and three other members.

The mission is being introduced to the British chemical industry through their chemical consultant for Great Britain and the U.S.A., Dr. George Lewi. It is a goodwill mission, the first of its kind, and among other topics to be discussed is the question of how to meet the expected growth of the chemical industry in Germany (especially I.G. Farben) and how to cope with the great deficiency in the supply of chemical raw materials.

Fuel Economy.—The possibility of effecting important economies by using the exhaust gases of factory power units for heating is the subject of an informative review produced by Crossley Bros., Ltd., Manchester, 11, in the latest "Crossley Chronicles." Several types of power units performing the dual role are shown and a variety of layouts is fully described and illustrated.

Underground Gasification in U.S.

IN an experiment that may provide the United States with a nearly inexhaustible supply of synthetic petrol, the Alabama Power Company in co-operation with the United States Bureau of Mines, has set afire nine-hundred tons of coal inside an Alabama hill in an effort to obtain valuable hydrocarbons. The coal, which had never been mined and burned briskly, was set alight on January 21, 1947, when incendiary bombs were dropped through holes drilled into the seam and the mass of bituminous deposits set ablaze. It was expected that the fire would continue for at least two more weeks. Through pipes set into the hill a steady stream of gas issued, created by the combustion going on underneath. At regular intervals, the gas issuing from the underground furnace was analysed by officials conducting the experiment.

To support the fire, air was pumped into the flame constantly, and at times oxygen or steam added. Thus far the test reveals that a controlled fire can be maintained underground and the resulting gases can be tapped. Though the gases are not particularly rich and can be burned only with difficulty, the experiment seems successful. The site was selected because it was ideal for the preliminary stages of the research. It is not, however, particularly suitable for the production of a synthesis gas, from which gasoline and diesel oil can be made, since the fire cannot be maintained at a temperature high enough for the desired chemical reactions.

This underground test is being made at the Gorgas mine of the company, some forty miles north-west of Birmingham, Alabama. Thirty feet below the surface, at the top of the hill, is a small seam of coal, too tiny to be worth mining. In 1946, engineers began cutting through the seam until they had isolated it on all sides, leaving a pocket of coal disconnected from the rest of the seam. From the top of the hill sixteen holes were then drilled into the coal and finally, at one corner of the pocket, coal and wood were piled and sprinkled with diesel oil. Beneath the surface the hill caught fire when sixteen incendiary bombs were dropped into the hole. Thermocouples registered the heat up to 2000°F. and then burned out. The fire has been going ever since.

Although air was constantly blown into the hill, because of the shallow overlying strata and its porosity the air seeped out after a certain pressure was reached. As a result it was impossible to create an intense heat.

When the fire dies down bulldozers are to move in and scrape away the entire top of the hill, laying bare the burned seam. If nothing but ashes was left, it would mean that all the values in the coal had escaped and that the underground burning process was not unduly wasteful of the resources contained in the mine.

U.S. Seeks Raw Materials

UNRESTRICTED use of the nation's natural resources during the war has put the United States in the new position of having to meet domestic needs by larger imports, by digging deeper into the earth, by using lower grades of ores, and by developing substitutes such as synthetics and new metal alloys.

The United States lead mines were once among the world's largest; to-day output is only half what it was 20 years ago. Already the States is importing half the copper needed by its industry; home production at the present rate of 1,000,000 tons a year may go on for the next ten years, thereafter will come a gradual decline.

For most other metals, life expectancy hardly reaches a decade. Only zinc, being in about the same position as lead, might last for 19 years. But chromium (one year), manganese (two years), mercury (three), tungsten and antimony (four), vanadium (seven), and even silver (eleven), are near exhaustion. Chromite, graphite, industrial diamonds, nickel, tin, and quartz crystals, have been imported for years. Lately, foreign shipments have increased to about 30 per cent of domestic needs in antimony, asbestos, manganese, mica, and tungsten. For half the production of aluminium, one of the most popular replacers of other metals, the raw material (bauxite) comes from overseas. Likewise cadmium, mercury, and potash sources at home can fill only half the domestic demand.

40,000 Tons Linseed Oil from Argentina

FOLLOWING the submission by George S. Messersmith, United States Ambassador to Argentina, to the Department of Agriculture in Washington, D.C., of the offer made by the Argentine Government of 40,000 tons of linseed oil for shipment prior to May 31, 1947, information has now been received indicating that American crushers have accepted the offer in full. The Department of Agriculture has announced that the deal has been closed with the Argentine government and arrangements have already been concluded for the first shipment to the United States with others to follow as soon as possible.

American Chemical Notebook

From Our New York Correspondent

LEAD production in the States, which had been declining for the past four years, is now increasing rapidly and is expected to reach pre-war levels in the near future. The peak total of 496,000 tons was in 1942, but by last year it had dropped to 332,000 tons. Now the output of primary lead refiners has risen to a monthly total of more than 40,000 tons, as compared with the record low figure of 18,600 tons last June. One reason for the decrease in lead mining and refining is the fact that no new ore deposits have been discovered in the States for many years. Other factors have been Government restrictions and price control, with the removal of which the demand for lead has become much more marked, resulting in sharp rises in lead prices throughout the world. In New York the price rose to 12.5 cents a pound—highest on record. Huge quantities of lead were used in the U.S. Government's atomic bomb project, and it follows that the manufacture of any commercial atomic equipment is certain to necessitate large quantities. Estimates of the domestic demand for lead reach a figure of more than a million tons per year, which is not expected to be satisfied, despite salvaging of scrap lead and imports from the principal producing countries —Mexico, Canada, Australia and Peru. In 1937 U.S. production of refined lead totalled only 533,000 tons, to which imports added 41,000 tons, the combined total being about half the present domestic demand. It must be realised, too, that the demand for lead in other countries is also acute, while world production remains far below the pre-war rate.

* * *

A research project to improve metal powder industrial techniques is being sponsored by the Industrial Research and Development Division of the Department of Commerce at the Stevens Institute of Technology, Hoboken, New Jersey. Research will be carried out under a 6-month "actual cost" contract. The Institute will test iron powders furnished by domestic producers to determine the factors affecting physical properties most suitable for widespread industrial application of powder metallurgy. Particle size, sintering methods, chemical composition, density and other conditions influencing the utility of powders will be studied.

* * *

An oil well 10 miles out in the Gulf of Mexico—the first operation of the kind so remote from land—is only a forerunner of others even more distant from the shore, according to an engineer's report to the American Society of Mechanical Engineers.

Possibly indicating that plastics supplies are becoming more plentiful in the United States, Monsanto Chemical Company has reduced the price of lustrene polystyrene by one-half cent per pound, bringing the basic price of the crystal moulding compound to 24½ cents. Total output of all kinds of plastics materials so far this year is estimated to be 10 per cent ahead of 1946, when demand was about three times in excess of possible output.

* * *

The use of strong light may enable scientists to bring about new types of chemical reactions, according to Dr. Michael Kasha, of the University of California, addressing an American Chemical Society symposium on "Colour and the Electronic Structure of Complex Molecules." Intense illumination, he said, excited many complex molecules, momentarily relaxing the electronic forces that bind them. For the instant, the atoms within the molecules were freed and could take part more readily in chemical reactions. The state of excitement, called the "triplet state," might last for only one hundred-thousandth of a second after illumination ceased and the molecule released energy absorbed from the light. Addressing the same symposium, Professor Melvin Calvin, also of the University of California, described how phosphorescent materials, those which absorbed energy from light and glow, could be attracted by magnets when under strong illumination.

* * *

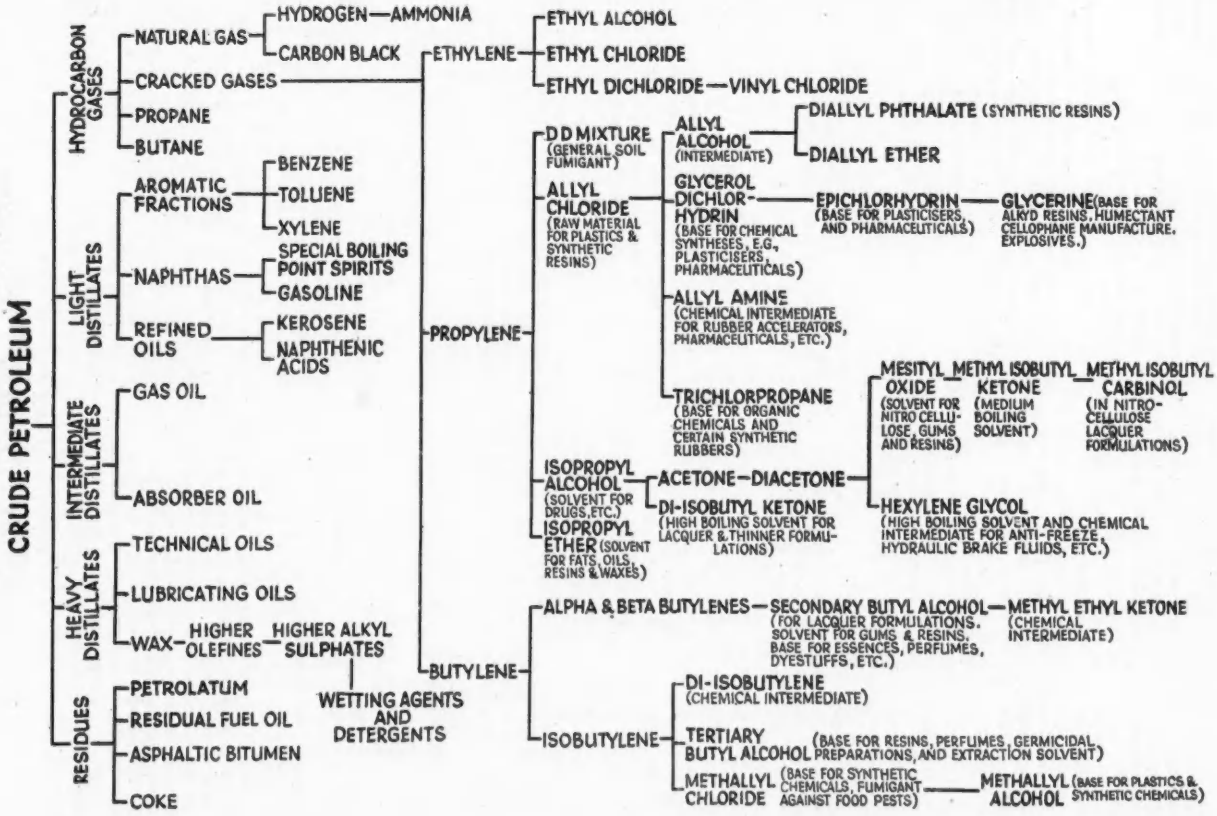
Crowding of atoms within a molecule changes its colour by causing it to absorb light of shorter wavelengths, it has been reported by a group of American scientists, who state that in complex molecules of dyes the replacement of a hydrogen atom with an alkyl group, composed of hydrogen and carbon atoms, might cause such crowding that the atoms piled up. Though the chemical change was slight, the physical crowding generally tended to change colours from blues to greens and from yellows to reds, also slightly reducing their brightness.

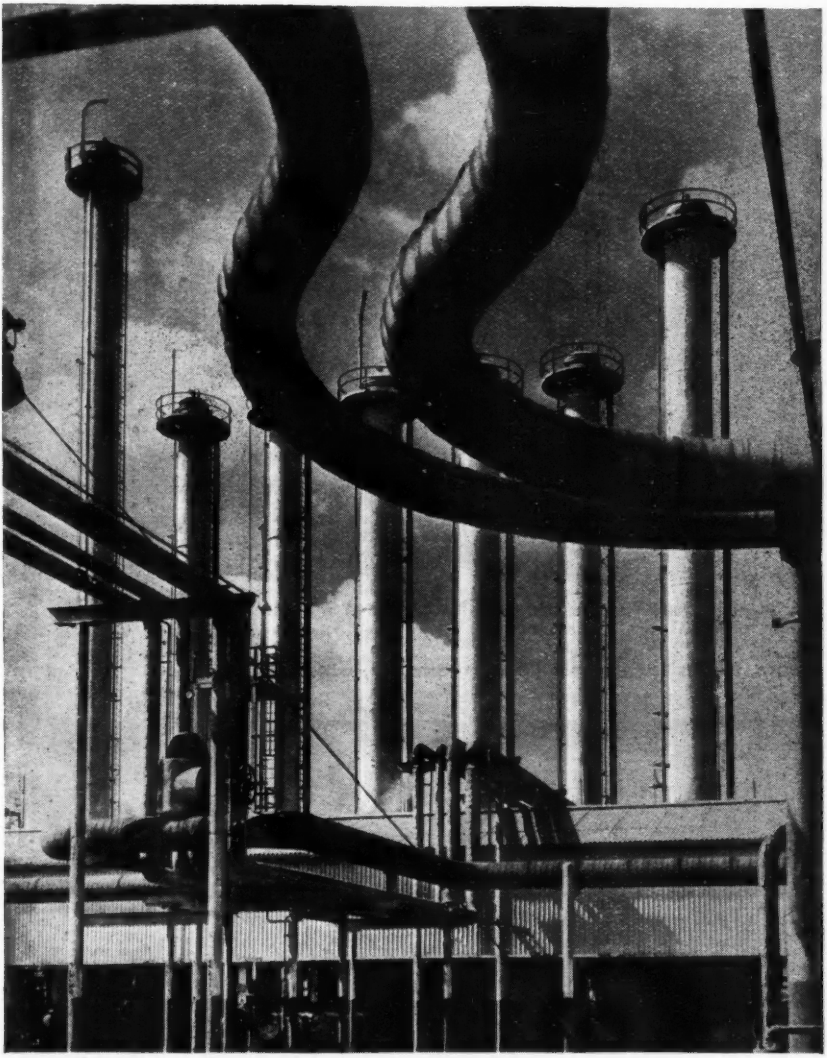
* * *

Development of a series of crotonic acid esters is announced by Shawinigan Chemicals, Ltd., Montreal. Principal products include allyl crotonate, ethyl crotonate, ethylene glycol cretonate, and glycerol tricrotonate.

* * *

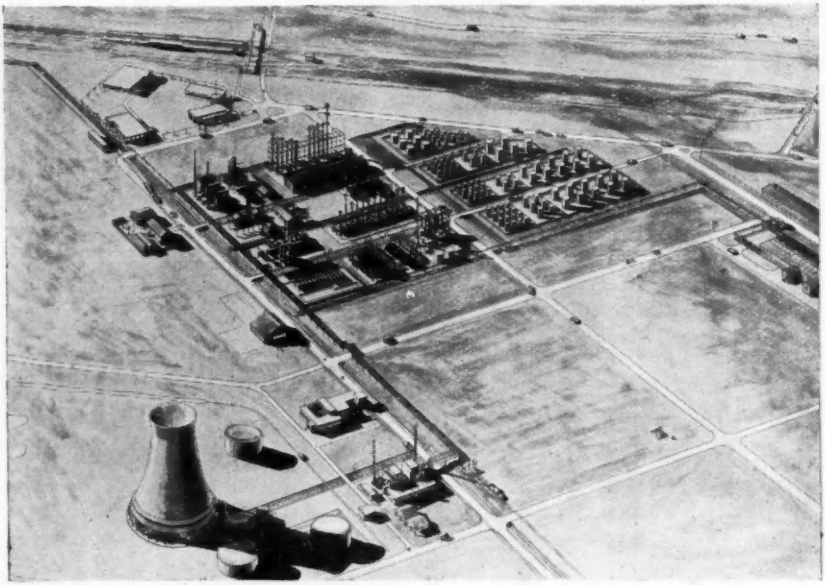
A rapid photographic method of measuring the potency of penicillin has been developed by scientists at the University of California College of Pharmacy. It cuts the required time from 16 to 3 hours.


CRUDE PETROLEUM
HYDROCARBON GASES
NATURAL GAS
HYDROGEN—AMMONIA
CARBON BLACK
CRACKED GASES
PROPANE
BUTANE
LIGHT DISTILLATES
AROMATIC FRACTIONS
BENZENE
TOLUENE
XYLENE
NAPHTHAS
SPECIAL BOILING POINT SPIRITS
GASOLINE
REFINED OILS
KEROSENE
NAPHTHENIC ACIDS
INTERMEDIATE DISTILLATES
GAS OIL
ABSORBER OIL
HEAVY DISTILLATES
TECHNICAL OILS
LUBRICATING OILS
WAX
HIGHER OLEFINES
HIGHER ALKYL SULPHATES
WETTING AGENTS AND DETERGENTS
RESIDUES
PETROLATUM
RESIDUAL FUEL OIL
ASPHALTIC BITUMEN
COKE
ETHYLENE
ETHYL ALCOHOL
ETHYL CHLORIDE
ETHYL DICHLORIDE—VINYL CHLORIDE
PROPYLENE
D D MIXTURE (GENERAL SOIL FUMIGANT)
ALLYL ALCOHOL (INTERMEDIATE)
DIALLYL PHTHALATE (SYNTHETIC RESINS)
DIALLYL ETHER
ALLYL CHLORIDE (RAW MATERIAL FOR PLASTICS & SYNTHETIC RESINS)
GLYCEROL DICHLORHYDRIN (BASE FOR CHEMICAL SYNTHESES, E.G., PLASTICISERS, PHARMACEUTICALS)
EPICHLORHYDRIN (BASE FOR PLASTICISERS, AND PHARMACEUTICALS)
GLYCERINE (BASE FOR ALKYD RESINS, HUMECTANT CELLOPHANE MANUFACTURE, EXPLOSIVES.)
ALLYL AMINE (CHEMICAL INTERMEDIATE FOR RUBBER ACCELERATORS, PHARMACEUTICALS, ETC.)
TRICHLORPROPANE (BASE FOR ORGANIC CHEMICALS AND CERTAIN SYNTHETIC RUBBERS)
ISOPROPYL ALCOHOL (SOLVENT FOR DRUGS, ETC.)
ACETONE—DIACETONE
MESITYL OXIDE (SOLVENT FOR NITRO CELLULOSE, GUMS AND RESINS)
METHYL ISOBUTYL KETONE (MEDIUM BOILING SOLVENT)
METHYL ISOBUTYL CARBINOL (IN NITRO-CELLULOSE LACQUER FORMULATIONS)
DI-ISOBUTYL KETONE (HIGH BOILING SOLVENT FOR LACQUER & THINNER FORMULATIONS)
HEXYLENE GLYCOL (HIGH BOILING SOLVENT AND CHEMICAL INTERMEDIATE FOR ANTI-FREEZE, HYDRAULIC BRAKE FLUIDS, ETC.)
ISOPROPYL ETHER (SOLVENT FOR FATS, OILS, RESINS & WAXES)
BUTYLENE
ALPHA & BETA BUTYLENES
SECONDARY BUTYL ALCOHOL (FOR LACQUER FORMULATIONS. SOLVENT FOR GUMS & RESINS. BASE FOR ESSENCES, PERFUMES, DYESTUFFS, ETC.)
METHYL ETHYL KETONE (CHEMICAL INTERMEDIATE)
ISOBUTYLENE
DI-ISOBUTYLENE (CHEMICAL INTERMEDIATE)
TERTIARY BUTYL ALCOHOL (BASE FOR RESINS, PERFUMES, GERMICIDAL PREPARATIONS, AND EXTRACTION SOLVENT)
METHALLYL CHLORIDE (BASE FOR SYNTHETIC CHEMICALS, FUMIGANT AGAINST FOOD PESTS)
METHALLYL ALCOHOL (BASE FOR PLASTICS & SYNTHETIC CHEMICALS)



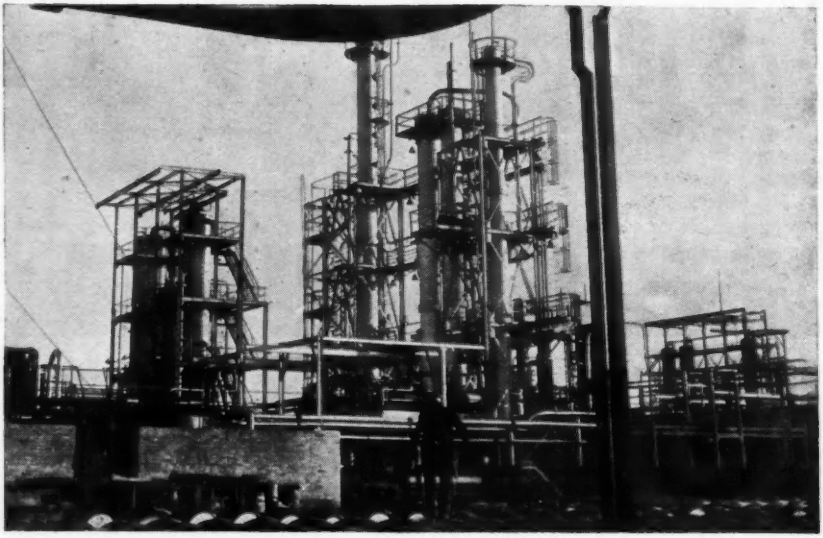
Chemicals from Petroleum

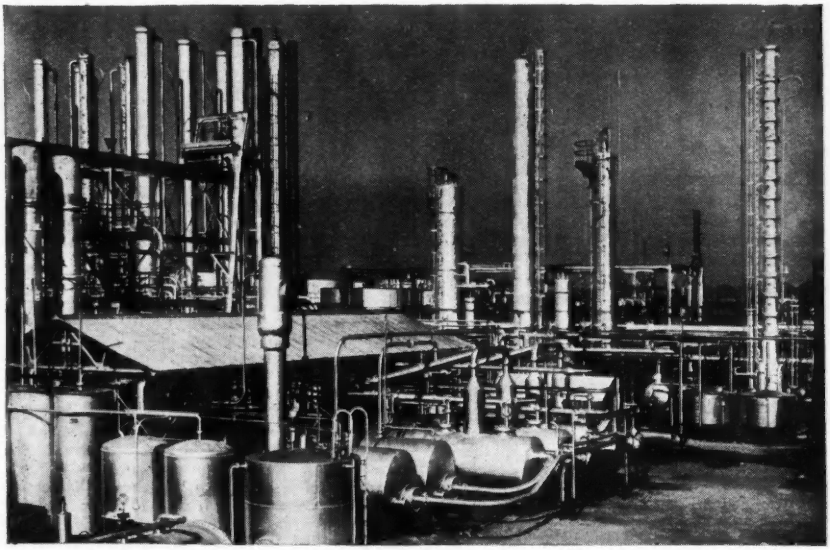
The Shell Company's plans for the manufacture of acetone and other chemicals from petroleum were announced in these pages last week. The picture above is of the Shell plant at Houston, Texas, showing columns for the distillation of acetone and isopropyl alcohol, manufactured from-cracked petroleum. The chart on the opposite page shows the many chemicals obtainable.



An aerial perspective drawing of the proposed new plant at Thornton-le-Moors, Cheshire.

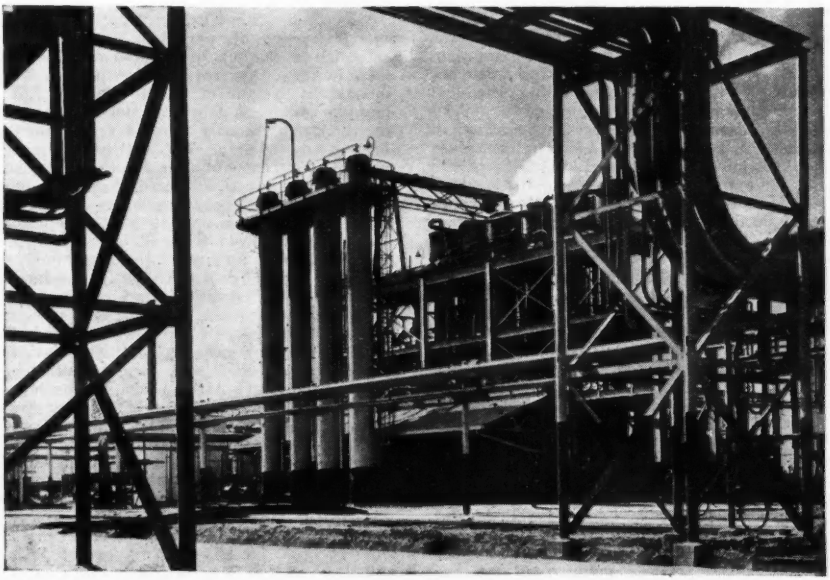
Below, the existing teepol plant at Stanlow, which is to be extended.





View of the Shell plant at Martinez, California, showing hydrolysers, distillation columns and other equipment for manufacturing ketones and alcohols from cracked petroleum gases.

Below, the reaction system for the production of isopropyl alcohol from propylene at the Houston plant.



Chemical Notes from South Africa

From Our Cape Town Correspondent

THERE is no prospect of an immediate improvement in the supply of soap and edible oils and fats in South Africa, says the deputy controller of soaps and oils. He pointed out that although the Union was capable of producing all its requirements, there was a world shortage of the necessary oils, fats, and oil-bearing seeds which in any case were controlled by the planning authorities of the United Nations. To relieve the shortage of edible oils, the Government was encouraging the local production of oil-bearing seeds, particularly groundnuts, but it would be a year or two before the benefit would be felt. Information from the International Emergency Food Council suggested that exportable supplies of fats and oils for 1947 would exceed the 1946 allocations, but they would still be substantially short of meeting the Union's requirements. Supplies appeared to be at least adequate for the first six months of 1947 and should progressively improve in the third and fourth quarters of the sales of these French products in the the year. In spite of the scarcity of raw materials in South Africa, regular but reduced soap production was being maintained and manufacturers were doing their best to arrange an even distribution.

French Offer of Dyes

A representative of a leading French chemical and dye manufacturing firm recently arrived in South Africa to promote the sales of these French products in the Union. He said that French manufacturers would soon be in a position to supply the South African demand for chemical compounds and dyes.

A half century of progress is described in a booklet issued by the African Explosives and Chemical Industries, Ltd., to mark the fiftieth anniversary of the establishment of the Modderfontein dynamite factory, which is claimed to be the largest explosives factory in the world. The booklet traces the early beginnings of the factory in 1896 to the present establishment occupying 15 sq. miles of territory, having an annual turnover of more than £3,500,000 and employing 4500 white and native employees.

One of the largest asbestos-cement factories south of the equator is to house the African Asbestos-Cement Corporation, Ltd., a recently registered company with offices at 95 Commissioner Street, Johannesburg. Building operations are well under way at Driemanskop, near Heidelburg, and, provided no unforeseen setbacks occur, production is expected to begin during March. Modern machinery is being installed, and it is expected that when production gets into full swing, 1,500,000 sq. ft. of asbestos-cement materials per month will become available to the building industry for distribution throughout South Africa. It is the intention of the company to employ ex-volunteers wherever possible. To start with, about 300 Europeans and natives will be employed, the number to be almost doubled when the factory gets into full production. An asbestos mine in the Eastern Transvaal has been acquired by African Asbestos-Cement, and this will be equipped with modern machinery.

Demand for Cement

The demand for cement in South Africa is so great that plans have been made to import considerable quantities. To meet this demand a new South African cement company has been formed, the Consolidated Portland Cement Co., Ltd. It is noted that a large number of shares (950,000 out of 2,000,000) have been subscribed firm. The remainder was underwritten, and shareholders of the Coronation Freehold Estates and of the South African Finance and Industrial Co., Ltd., were offered 700,000 shares (one for three held), while there remained 350,000 shares for the public, the issuing price being 6s. throughout. An agreement with Vickers-Armstrongs, Ltd., was stated to ensure not only the supply of plant but also its supervision during the first six months of service. It can, therefore, be said that the company has a good chance.

Goya, of New Bond Street, London, manufacturers of perfumes, etc., are to establish a factory in Cape Town for the manufacture of soaps and cosmetics. The managing director of D. R. Collins, Ltd., manufacturers of Goya products, was in South Africa recently to make arrangements for the new factory. He said that the company would rent premises for the first year or so until they could build their own factory. Suitable premises have been considered so that it is possible that production may begin towards the end of the year.

A South African firm is to make much of the plant ordered in the Union from a large British firm of manufacturers of chemical machinery, stated Mr. Keith Fraser, a member of the British company, who arrived recently in Johannesburg. "Negotiations are still proceeding, so I cannot reveal the name of the South African firm, but on large contracts up to 60 per cent of the necessary plant will be made here," he said. He was particularly impressed with the lines along which South African industry was developing and thought there were good prospects for the rubber, chemical and paint industries in the Union. "I think the conservation of fruit, also calling for chemical plant, will become increasingly important," he added.

French Coal and Power

Modernisation and Development Plans

UNDER the Monnet Plan, details of which have recently been published, it is proposed to increase French coal output per annum to 65 million tons by 1950 and to 70 million tons in 1955, assuming a working year of 285 days. Average annual output before the war was, over a 15-year period ending 1939, about 50 million tons. During the war output dropped to 42 millions in 1941-3, and to 17.2 millions in 1944. The estimate for 1946 is 48 millions. Foreign workers in the mines amounted to about 22 per cent and prisoners of war 18 per cent of total personnel. A gradual decline in total number of mine workers is anticipated as follows: 1946, 322,200, 1950, 286,860; 1955, 283,700.

On the subject of French coal reserves, the Commission de Modernisation des Houillères has estimated these as follows (in million tons):

(A = certain or probable; B = hypothetical; C = A + B: D = annual output, and E = probable life, that is C ÷ D)

	A	B	C	D	E
					Years
Nord et Pas de Calais	850	2650	3500	35.5	99
Moselle	>2360	>3000	>5360	15.7	315
Loire	90	140	230	4.1	56
Gard, Hérault	160	>300	>460	3.3	134
Tarn	100	—	100	1.4	72
Aveyron	32	30	62	0.8	78
Bourgogne	62	20	82	2.4	34
Centre	28	25	53	1.4	36
Fuveau	10	120	220	1.5	146
Alpes (La Mure)	60	25	85	0.5	170
Hostens et Landes	110	20	130	1.3	56
Miscellaneous	20	50	70	1.4	50
Totals	>4000	>6400	>10400	70.3	

In addition to the supplies from her own mines it was hoped that in the Peace Treaty France would secure 20 million tons per annum for twenty years from the Ruhr.

The comparative scarcity of coking coals in the French coal reserves will prevent any material increase in production of this class. On the other hand the predominance of coals of high volatile content will necessitate large development of distillation and other processing, especially in the Moselle basin. At least 20 per cent of the total output, if not more, will not be able to support any appreciable transport costs, and will thus have to be utilised locally in power stations and chemical works.

The cost of this development and modernisation work is estimated at 115 milliards (1000 million) fr. as from 1946, rising to 150 milliards in ten years, plus 25 milliards for associated industries. This would be roughly divided into three categories: (a) housing for the workers, (b) new plant, (c) modernising existing plant.

French coal economics is being studied also in close relation to electricity supply, water power, metallurgy, etc. Water power, for example, in 1946 was estimated to supply 13 milliards kWh, and under the plan would be increased to 24 milliards by 1950. By this means it is hoped to increase supplies of electric power to various industries by a substantial percentage, as follows:

	1938	1951	Per cent. increase
Traction (mill. kWh) ...	1300	2300	77
Electrochem. and met. ...	3600	5300	47
Metallurgy	1700	3000	77
Coal and other mines ...	2000	3600	80
Chem. Ind....	1700	3700	118

The chemical industries include more especially: sulphuric acid and superphosphates, glass, rubber, pulp and paper, nitrogen compounds, soda and potash, soaps, perfumes, etc. It is anticipated that, in regard to glass, there will be important developments in electric fusion. In the electrochemical and metallurgical section, aluminium and magnesium production will require 2080 million kWh in 1951 as compared with 1430 million in 1938, thus accounting for over a third of the total. The following are the estimated figures of production in 1951, reckoning 1938 as the basic 100:

Sulphuric acid ...	125	Glass	180
Rubber	170	Paper pulp ...	150
Paper and cartons	125	Misc.	110
Aluminium ...	200	Chlorine	120
Calcium carbide ...	115	Cyanamide ...	150
Electrolytic zinc ...	120	Ferrous met. and	
Electric steel ...	265	alloys	175

Tung oil exports.—China exported last year about 36,000 long tons of tung oil, of which 24,000 tons went to the United States, over 5000 tons to the United Kingdom and the remainder to the Soviet Union. The country's total output amounted to about 45,000 long tons, including a small carry over from previous seasons.

German Chemical Industries

Hampered by Coal Shortage

DESPITE a slight improvement in Ruhr coal production following introduction of the "point system" of special ration allocations to mine-workers, shortage of coal remains the principal obstacle to increased production of chemical manufactures in western Germany. The I.G. Farbenindustrie works at Leverkusen, near Cologne—with 15,000 workers, the largest industrial enterprise in the British zone—had to close down several departments for an indefinite period. Laboratories and the pharmaceutical division are still in operation, but thousands of workers in other branches are kept employed only on clearance work. The I.G. works at Wuppertal have also had to curtail operations because of the fuel shortage.

Pharmaceutical manufacturers are given priority in fuel supplies, but many of the smaller firms are suffering from raw material shortages. Thus Chemische Fabrik Rodenkirchen, which has been producing aminophenazone as a substitute for pyramidone, complains about insufficiency of methanol and aniline supplies. Sodium bromide is in short supply because the firm used to cover its requirements from eastern Germany, while caffeine and citric acid used to come from the French zone. Most of the bigger pharmaceutical plants are either in the U.S. zone (Hoechst, Wiesbaden, Darmstadt, Frankfurt) or in the Soviet zone (Dresden, Jena, Berlin). Most of these works are said to be partly employed in meeting urgent needs.

Madaus of Radebeul has developed a new process for making penicillin, using whey as a culture basis. A firm at Wesermuende is producing insulin at a rate of several hundred thousand units a month from sea-fish pancreas. Other classes of important drugs in short supply, especially in the Soviet zone, are sulphonamides and opiates.

The coal shortage has necessitated new cuts in the fertiliser industry. A.G. für Stickstoffduenger at Knappsack worked with one furnace only from September, but put a second one into commission towards the end of November, thus bringing the production to 70 tons of carbide a week. While the output of the first furnace is being used for making cyanamide, that of the second furnace is used for making acetic acid. Chemische Fabrik Kalk G.m.b.H., Cologne, had to close down temporarily, with a consequent loss of some 600 tons of nitrogen; the company also complains of a shortage of lime. In the Soviet zone the potash production is to be raised to 800,000 tons, part of which is to be exported in exchange for nitrogenous fertilisers.

I.P. Bemberg A.G., Wuppertal, reports that half its rayon plant is ready for operation. The cuprophane plant could be put into commission completely. The company claims that a new spinning process developed in the past few years enables its product to compete successfully with cotton. Cell wool is now being produced in various plants in all occupation zones. Buna rubber is made in substantial quantities at Schkopau and Marl, while the production at Leverkusen was described as insignificant even before the fuel crisis reached its climax.

Potash Find

Help to Canadian Agriculture

THE discovery in Saskatchewan of Canada's first source of potash will be of "tremendous importance to agriculture if there is enough of it," an official of the Federal Department of Agriculture said recently. "A lot will depend on the grade and the extent to which it exists," he added. "We have had only scanty reports of the discovery, but we're very interested."

A spokesman for the Resources Department here said a Federal observer would be sent to the area—100 miles north-west of Saskatoon in the Unity oil fields—if subsequent tests indicate the discovery is extensive.

The discovery of the mineral in Saskatchewan was made last July by the Saskatchewan Resources Department. Potash was discovered in all-foot bed and assayed at 23 per cent K_2O (potash) at a depth of 3475 ft. The first find was made in analyses of samples from a salt core. The department had further analyses made which revealed contents of potassium chloride as high as 65.6 per cent. Examination of a deep test well showed that a salt bed underlies the major portion of Alberta and Saskatchewan but potash occurs in considerable quantities only in the Saskatchewan section of the bed. There were deposits elsewhere in Western Saskatchewan but the Unity occurrence was the most favourable for commercial development.

The find may effect great saving to Canadian agriculture which buys $4 million annually at around $40 per ton.

Chilean nitrate.—An Egyptian financial group is reported to be interested in providing capital for the exploitation of nitrate deposits in the northern parts of Chile.

PARLIAMENTARY TOPICS

IN the House of Commons last week, questions of interest to the chemical industry included the following:

Exploiting British Minerals.—The exploitation of new mineral resources in the United Kingdom is being treated as a matter of urgency. This assurance was given by the Minister of Fuel when asked by Mr. S. R. Lavers what steps were being taken to explore and develop lead and zinc in the North Pennines. Mr. Shinwell recalled he had appointed a committee to inquire into the resources of certain minerals, including lead and zinc, whose report he was awaiting. The possibility of further tin production was the first consideration, but the committee would "address themselves with urgency" to other minerals.

Oil Firing Priority.—That high priority should be given to largest fuel consumers in the supply of oil-burning equipment was the recommendation contained in a question by Mr. F. J. Erroll to the Minister of Fuel. Mr. Shinwell said that such priority had been arranged, but other considerations affected the conversion to oil burning, such as local difficulties in coal or oil distribution, the type of coal to be saved and the length of time required to complete the conversion. Asked by Mr. C. Osborne if he was aware some conversions to oil had not taken place because requests for a three-months guarantee of oil supply had been refused, Mr. Shinwell invited the questioner to notify him of any firm which had had that experience. Mr. Osborne: I will.

Surplus Generators. — The difficulties encountered by Messrs. W. J. Bush and Co., Ltd., Widnes, in procuring a diesel generating unit, of which several were said to be lying idle in the R.E. stores at Widnes, were described to the House by Mr. C. N. Shawcross, who claimed that the company's attempts to procure the means to continue the manufacture of essential medical supplies had been frustrated by the passing of their application from the War Office to the Board of Trade and to the Ministries of Fuel and Power and of Supply. The spokesman for the Board of Trade stated that the engines referred to were still required by the War Department, but a limited number of diesel generators from Service stores were available for loan and the company had been offered one of these.

Chlorine Prices.—The cost of chlorine supplied for industrial uses in this country was the subject of two questions by Mr. J. Lewis, who, in the first place, asked the President of the Board of Trade to what extent the production cost of DDT could be lowered if chlorine were available here at the price ex-works at which it was available in the U.S.A.—£9 15s. a ton. Sir Stafford Cripps "was not in a position to make this estimate." Sir Stafford's reply was not much more informative when the subject was again raised by Mr. Lewis, asking for the names of three firms responsible for the production of chlorine in this country, the proportion for which they were responsible and the prices charged. Sir Stafford: The known producers of chlorine are Imperial Chemical Industries, Ltd., the Staveley Coal and Iron Co., Ltd., and L. Dennis and Co., Ltd., Manchester. As regarded quantities produced, it was not in accordance with established practice to disclose such information, said Sir Stafford; and, as regarded prices, only I.C.I. delivered in bulk in tank wagons and their prices were on a delivered-to-consumer and not on an ex-works basis.

Groundnut Crop.—Groundnuts in Nigeria amounting to 264,358 tons and a further 42,300 tons in Gambia from the new crop were being held in February for shipment to Great Britain. There is no possibility this year of moving the crop very quickly, owing to shortage of spare parts for the Nigerian railways—a matter "which is causing the Ministry of Food great concern."—Mr. J. Strachey.

Despite the fact that the Board of Trade has, since 1945, sponsored and completed 47 factory extensions and sponsored the building of six new factories, there are 47,000 unemployed in the North-East development area.—Mr. L. Wilkes.

Manufacturers of heavy electrical plant and boiler makers have promised their fullest co-operation in increasing and accelerating the output of electrical generating plant. Every endeavour will be made to ensure the necessary supplies of labour and material for the manufacture of heavy electrical plant and boilers. — Mr. A. Greenwood.

Instructions have been issued to steel producers to give priority to the supply of all steel required in connection with the coal/oil conversion programme.—Mr. J. Wilmot.

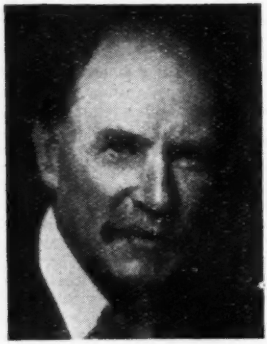
Belgian Steel for Britain.—The British delegation of steel experts has returned to London from Brussels, where agreement was reached with the Belgian steel syndicate, *Sybelae*, for the supply of 92,000 tons of steel during the coming year.

The Minister of Food has amended the Sugar (Control and Maximum Prices) Order, 1943, as follows:

(a) Maximum wholesale price of manufacturing sugar increased by 1d. per lb; (b) maximum retail price of manufacturing sugar increased by 1¼d. per lb.; (c) maximum wholesale price of all sugar packed in 1 cwt. bags increased by 1½d. per cwt.

Obituary

DR. ALEXANDER SCOTT, F.R.S., whose death occurred last week at his home at Ringwood, Hants., had been prominently associated nearly all his active life with the advancement of science knowledge at Cambridge University and the British Museum. The son of the Rector of Selkirk, Dr. Scott distinguished himself soon after his arrival at Edinburgh University by becoming senior medallist in the chemistry class, and at Cambridge, where he was assistant to Sir James Dewar, Jacksonian Pro-



The late Dr. Alexander Scott, F.R.S.

fessor of Natural Philosophy, he reached the first class of the Natural Science Tripos in 1879. His outstanding ability at Cambridge had then already procured him the Clothworkers' Exhibition in physical science and a foundation scholarship at Trinity. He left Cambridge in 1884 to direct the science teaching at Durham School and Middlesbrough High School and, returning in 1891, remained at the University until in 1896 he was appointed superintendent of the Davy-Faraday Research Laboratory at the Royal Institution, where he remained for 15 years. He was elected a Fellow of the Royal Society in 1898 and in the following year became secretary of the Chemical Society, with which he was actively associated until 1917, later as treasurer and finally as president. His long connection with the British Museum started in 1919 and was connected with his own research in the restoration and preservation of archaeological and other specimens. His expertness in this field enabled him to play an important part in safeguarding in Egypt in 1924 the relics recovered by Mr. Howard Carter from the tomb of King Tutankhamen and those which Sir Leonard Woolley unearthed at Ur of the Chaldees.

The Chemical Society in an appreciation of Dr. Scott, says:

The record of Dr. Alexander Scott's services to the Chemical Society is a proud one which it will be given to few to surpass or equal. Elected a Fellow of the Chemical Society as long ago as 1879, one year after he had been elected to a Foundation scholarship at Trinity College, Cambridge, Dr. Scott was a Fellow for no less than 68 years. In 1897 he was elected a member of the Council of the Society and served for two years before being elected an honorary secretary in 1899. Honorary secretary until 1904, he was in that year elected honorary treasurer, a post which he held until 1915 when he was elected president.

The Society was fortunate in having Dr. Scott as its president for the first half of the first World War. In the pre-war years he had made himself familiar with every part of the Society's work and it was characteristic of him that no detail was too small to escape his attention. The ease with which the Society adjusted itself to the war conditions was due in great measure to his leadership. Following his presidency, Dr. Scott continued to serve the Society as a vice-president from 1917 until 1928 and again from 1930 to 1933. The Society's debt to Dr. Scott for so many years of loyal service is indeed great.

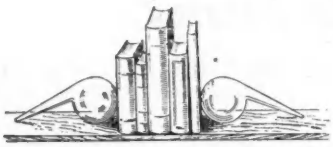
PROFESSOR L. S. FREDERICIA, head of the Danish State Vitamin Laboratory, has died at Copenhagen at the age of 66.

Connected with the Victoria Rubber Co., Ltd., since its foundation by his father in 1877, MR. PATRICK MILLER MATTHEW has died in Edinburgh at the age of 89. Mr. Matthew became chairman and managing director of the company in 1894, presiding at every annual meeting and being actively engaged in its conduct until less than eighteen months ago.

The death has occurred suddenly, at the age of 70, of MR. A. ELDER REED, chairman of A. Elder Reed & Co., Ltd., a past chairman of the British Chemical and Dyestuffs Traders' Association and treasurer of the Jointless Flooring (Oxychloride) Association. Mr. Reed, in association with Mr. L. W. J. Angell, now managing director, founded the firm of A. Elder Reed & Co., Ltd.

World Scarcity of Fertilisers

The largest deficiency in world supplies of fertilisers, estimated at 2,261,000 metric tons of nitrogen and all soluble phosphates and potash, is recorded by the International Emergency Food Council's committee on fertilisers. This is the greatest deficiency since 1939, despite the fact that world production is estimated to have risen 15 per cent, and is attributed chiefly to the greatly increased demand all over the world and especially in war devastated countries and the reduced output of fertilisers in Europe, especially in Germany.



A CHEMIST'S BOOKSHELF

Characterisation of Organic Compounds. F. Wild. Cambridge University Press. Pp. 306. 18s.

Since organic analysis differs from inorganic in that there is no set scheme to be followed, any new ideas which will enable an organic compound to be correctly allocated to its class are to be welcomed. It is therefore disappointing to find that the present volume, which claims to be suitable for final year students and research workers, makes scarcely any mention of the tests to be applied before a compound can be correctly classified. This state of affairs is illustrated by pointing out that only four pages are devoted to this very important and necessary preliminary investigation. Equally brief is the author's treatment of the separation of mixtures and he states that "the effective separation of the components is based on differences in the physical properties of the compounds or their derivatives." Although this may be true in a large number of cases, it is by no means so from the student's point of view, who is normally expected to separate mixtures by utilising the different chemical properties of the components. Under these circumstances it would have been wiser to devote more than three pages to this topic, to give some examples and possibly to give a short table which would cater for the majority of the more common types of compounds likely to be encountered by a final year student.

The first two chapters of the book deal with the selection of a reagent and the preparation of a suitable derivative, and the classification of compounds and the separation of mixtures. In the former, details are given for carrying out melting and mixed melting points and also distillation for determining the boiling points of liquids. Here it may be noted that Siwoloboff's method for the determination of the boiling point of a small quantity of a pure liquid is relegated to a collection of references at the end of the chapter dealing with special methods for small quantities. This method, being quick and reasonably accurate, merits further mention.

The remaining nine chapters deal with different groups of organic compounds and in each chapter are given all the important general methods which have been published up to the end of 1943 for identifying the various classes of compounds. Here the situation is in marked contrast with the elementary nature of the opening chapters. All the common reagents and methods are quoted, together with a large number of less familiar ways of identification. The treatment in each chapter follows the same general plan—a summary of the methods of identification at the beginning, and a consideration of them together with the relative equations; then follow the details, both theoretical and practical, for the preparation of each derivative including references to the original literature, and at the end a wide selection of compounds are listed together with the melting or boiling points of their derivatives in tabular form. Where the reagent used is one that normally cannot be purchased, directions for its preparation are given or if these are to be found in Organics Syntheses, the J.A.C.S. or J.C.S., only the reference is quoted.

Although the methods for preparing derivatives may well have been reviewed up to 1943, in the case of compounds such as ethers and esters which normally require fission before they can be identified, some of the more up to date methods have not been mentioned.

This book provides a most useful summary of the various ways in which an organic compound may be characterised, but in view of the large number of published methods, a more critical presentation would have been more useful as there is now the danger that students, in particular, may not be able to see the wood for trees.

As this book is designed primarily for use in the laboratory the instructions for the actual making of derivatives should stand out from any theoretical matter which accompanies them. Unfortunately, this has not been done and so detracts from the use of the book. If this could be remedied in future editions and a few pages added at the beginning showing how to allocate a compound to its class, bearing in mind that the widest selection of derivatives is of no avail until a compound has been classified, a far more balanced and hence more useful book would result. In its present form it makes an admirable reference book but has limited uses in the laboratory.

GUY G. S. DUTTON.

Home News Items

"Britain's Best" Exhibition. — The "Britain's Best" Engineering and Metalcraft Exhibition is now to be held at the Royal Horticultural Hall, London, S.W.1, from May 12 to 23, so that it will be available to visitors to the B.I.F. March 14-26 were the dates originally proposed.

Lead from "Pluto."—Some 15,000 tons of lead as well as steel rod and steel strip will, it is estimated, be made available for industry by the recovery, now in progress, by the Ministry of Supply of the undersea pipeline, "Pluto," by which petrol was conveyed to the Allied invasion forces.

Fuel Efficiency.—In connection with the Glasgow Corporation Scottish Fuel Efficiency Exhibition opening on March 19, a conference is to take place in Kelvin Hall on March 25, 26 and 27, when at 10.15 a.m. and 2.15 p.m. daily, a number of experts will speak on a variety of aspects of fuel efficiency.

Coal Saving.—More than 125,000 tons of coal a year will be saved by the installation of oil-burning furnaces at the Dalziel steel plant of Messrs. Colvilles, Ltd., Motherwell, and the Linwood works of the Ministry of Supply, Renfrewshire, which is being managed by Messrs. William Beardmore and Co., Ltd.

I.C.I. Extensions.—Imperial Chemical Industries, Ltd., have authority to proceed with the erection at Grangemouth of two buildings at a cost of £140,000, and priorities will be given, in view of the importance of the products to be manufactured there. The scheme is part of the £2,000,000 extension plan for their Grangemouth dyestuffs section announced by I.C.I. some months ago. Chemicals used in the manufacture of mepacrine were produced at this plant during the war. Some 900 workers will be employed as a result of the present scheme.

More Steel.—An expansion scheme which will cost approximately a quarter of a million to develop a South Yorkshire steelworks is the latest manifestation of the country-wide effort to procure greatly increased iron and steel production. The promoters of the present scheme are John Baker and Bessemer, Ltd., whose plan will include a new steel smelting shop at their Kilnhurst steelworks, near Mexborough, with a 60-ton furnace from which an output of some 40,000 tons annually is expected. Application has been made for permission to raise the authorised capital of the company from £500,000 to £850,000.

Employment Cuts.—Progressive reductions of the numbers employed at the Imperial Chemical Industries' plant at Billingham has been announced, as a result of the continued fuel shortage. As from last Monday, 400 process workers are being laid off weekly and 1600 are expected to be idle at the end of four weeks.

Surplus Chemicals.—Wartime materials of which the Ministry of Supply is seeking to dispose, if a commercial use can be found, include mixtures of equal parts of isopropylbenzene and butylbenzene nitrated to the mono- and dinitro stages and titanium tetrachloride.

Export Licences.—Several deletions from, and additions to, the list of goods for which export licences are required are notified by the Board of Trade. Goods for which export licences are no longer required include decolorising and activated carbons, charcoals, diphenylamine and its salts and beeswax: and titanium compounds for which export licences are required have been reduced to titanium hydroxides and titanium oxides. Additions to the list requiring licences include ferro alloys, chromium and tungsten.

Two women died and three women and a man were injured—three seriously—when an explosion, followed by fire, occurred on Thursday in the pyrotechnics factory of Wallop Industries, Ltd., near Middle Wallop, Hants.

NEXT WEEK'S EVENTS

MONDAY, MARCH 24.

Royal Society of Arts. John Adam Street, London, W.C.2, 5 p.m. Dr. J. A. V. Butler: "Enzymes, their Isolation, Structure, Mode of Action and Place in Nature."

TUESDAY, MARCH 25.

Experimental Stress Analysis Group. University College, London. Conference (also Wednesday and Thursday). Professor J. F. Baker: Experimental Stress Analysis. Discussions on brittle lacquers, photoelasticity and electric strain gauges.

THURSDAY, MARCH 27.

Mineralogical Society. Geological Society of London, Piccadilly, W.1, 5 p.m. Scientific papers. Royal Institute of Chemistry, 30 Russell Square, London, W.C.1. Annual general meeting.

Personal

Chadburns (Liverpool), Ltd., announce that MR. F. B. JOHNSTON has retired from the board owing to ill-health. MR. E. A. MEARNS has been appointed a director, and MISS I. M. SHALLCROSS secretary of the company.

MR. JAMES PETRIE, former financial secretary and staff superintendent of Messrs. Colvilles, Ltd., who is leaving the firm to take up a new appointment after 45 years' service, was on March 14 presented with a gold cigarette case and silver tea stand by the management and staff.

SIR ROBERT ROBINSON, the British chemist, has been awarded the 1947 Franklin Medal, highest award of the Franklin Institute, for his recent investigations of pyrimidine anologues and their reaction to vitamin B.

PROFESSOR WILLIAM KERR, who retired from the Chair of Civil and Mechanical Engineering and Applied Mechanics at the Royal Technical College, Glasgow, at the end of last year, has been presented with a cheque and wireless set at a complimentary dinner in Glasgow. He announced that he wished the money to be used to set up the "William Kerr Fund for Engineering Students" at the College. The new fund, to which Professor Kerr's friends in industry, former students, and other personal friends contributed, will be administered by the Professor of Engineering, the Director of the College, and other co-opted members.

MR. FRANCIS WILLIAM HUNT, chemical merchant, a director of Fox Roy Allemand & Co., Fox Roy & Co., Ltd., and Fox Roy Moufarege & Co., who died in November last, left £7664, net personalty £5799.

DR. EDITH JU HWA CHU, a leading organic chemist in China and one of the only two women professors in Peiping University, is visiting Britain for two months under the auspices of the British Council to study in the biochemical institutes at Birmingham, Cambridge and Oxford.

New Industry for Britain

Last week's announcement by the Shell Petroleum Company of the proposed production of chemicals from petroleum envisages a new and important industry for Britain. Research workers and technicians have been working for many years to discover new uses for petroleum. Now the results of their efforts open up vast new fields of

development. The picture above shows Mr. G. Legh-Jones, managing director of Shell Petroleum, speaking at the conference at which the plans were announced, supported by (left to right) Mr. G. H. W. Cullinan, general manager, Shell Chemicals; Mr. F. H. Braybrook, Industrial Department, Shell Petroleum; Mr. J. A. Oriel, Shell Chemicals; and Mr. J. P. Berkin, Trade Relations, Shell Petroleum. Other illustrations are on pages 346-9.

Overseas News Items

Lime Silicate.—Bavaria is to supply lime silicate to Switzerland.

Belgian Price Cuts.—Price cuts ranging from two to ten per cent in prices of chemicals and pharmaceuticals have been ordered by the Belgian authorities.

Brazilian Sulphuric Acid Plant.—The production of sulphur and of sulphuric acid on a commercial scale is to be started in Brazil.

Czechoslovak Penicillin.—The manufacture of penicillin is to be started in Czechoslovakia.

Calcium Carbide to Brazil.—Brazil has limited imports of calcium carbide to 11 million kilograms for this year.

Saxony Arsenic Plant.—Plants for the production of sulphuric acid and arsenic have been established in Freiberg, in Saxony.

Tung Oil.—Allocation control over tung oil has recently been removed by the International Emergency Food Council.

Increased Alsatian Potash.—The potash mines in Alsace produced 56,321 tons in December 1946, an increase by 16,321 tons over the monthly average of 1938.

New Tin-making Factory.—To discuss plans for opening a tin-making factory, Mr. R. J. Cox, of Metal Box Co., Ltd., has arrived in Dar-es-Salaam.

Potash Supplies.—According to the fertiliser committee of the International Emergency Food Council, world potash supplies should meet world demand by 1948.

Rhodesian Zinc and Lead.—Output of Rhodesia Broken Hill in February was 1650 tons of zinc and 1170 tons of lead. No fused vanadium was produced.

U.S. Neoprene Plant.—Poland is reported to be interested in acquiring du Pont's Neoprene plant at Louisville, Ky., and dismantling and shipping it to Poland.

U.S. Output of Sulphur.—Production of sulphur in the United States in November continued high at 355,179 long tons, exceeding October's figure by 7 per cent.

Belgo-Danish Agreement.—Cryolite and drugs are to be sent to Belgium by Denmark, which is to receive mainly chemicals in return, under a supplementary trade agreement signed in Copenhagen last month.

U.S. Chemists link up.—A consolidation of the activities of the American Chemical Society and the American Institute of Chemists is, according to reports, planned to take place this spring.

U.S. Synthetic Oil Plant.—A plant is to be erected, at a cost of 16,000,000 dollars, at Brownsville, Texas, by Carthage Hydrocol, Inc., for the manufacture of synthetic oil products and chemicals from natural gas.

Norwegian Bauxite Imports.—The Norsk Aluminium Company, of Oslo, will import 15,000 tons of bauxite, valued at about 450,000 Norwegian crowns, stored in Minden in Western Germany, where no possibility exists of utilising these stocks.

Canadian Chemistry Professor charged.—Dr. Raymond Boyer, Professor of Chemistry at McGill University, Montreal, is on trial in Canada on a charge of violating the Official Secrets Act. He is the last Canadian to be charged following last year's investigation into Russian espionage.

Lead Shortage.—Production of lead in the United States dropped 15 per cent compared with 1945 states the American Bureau of Mines. Nearly 500,000 tons of refined lead was made available for shipment from refineries to consumers in 1946, a 28 per cent drop from the figure of 688,000 tons in 1945.

Alginic Acid Substitute.—Alginic acid derived from marine plants has been used in Germany as a substitute for casein in paint emulsions. A detailed report on this development has been issued by the U.S. Department of Commerce.

Belgo-Czech Trade Agreement.—A large number of chemical products and dyestuffs will be supplied by Belgium to Czechoslovakia under a new trade agreement. Zinc, tin, copper and cobalt as well as alloys will also be delivered.

New Insecticide Plant.—Commercial Solvents Corporation, Pittsburgh, is erecting a plant for the manufacture of a powerful agricultural insecticide known as Sixide. The plant will be located at Terre Haute, Ind., and will be completed in time to provide the insecticide for use on 1947 farm crops.

Calcium Alginate from Seaweed.—A factory for the manufacture from seaweed of calcium alginate will shortly be erected at Kilkerrin, Connemara, by the newly-formed Alginate Industries (Ireland), Ltd. A variety of by-products will later be manufactured from the seaweed which, during the war, was exported in large quantities. The new company is a branch of an English concern of the same name in which the Irish shares have been taken by Mr. P. J. O'Donoghue and Dr. M. J. and Mrs. McDonough, Galway.

Company News

A trading profit of £90,997 (£77,202) was made by **Savory and Moore, Ltd.,** for the year ended March 31, 1946.

Total income for 1946 of **Yorkshire Indigo Scarlet and Colour Dyers, Ltd.,** was £15,889 (£15,240), yielding a net profit of £2730 (£3734).

The name of Owen W. Marks, Ltd., chemical manufacturers, etc., Dewsbury, has been changed to **Brown's Laboratories (Dewsbury), Ltd.**

The nominal capital of **Metemicals, Ltd.,** manufacturers of chemicals and chemical products, etc., 110 Cannon Street, London, E.C.4, has been increased by £9000 in £1 ordinary shares beyond the registered capital of £1000.

The name of Shell Chemical Co., Ltd., St. Helen's Court, London, E.C.3, has been changed to **Shell Chemical Manufacturing Co., Ltd.;** that of Shell Chemical Distributing Co., Ltd., same address, to **Technical Products (1946), Ltd.,** and that of Technical Products, Ltd., same address, to **Shell Chemicals, Ltd.**

New Companies Registered

Dyco, Ltd. (431,062).—Private company. Capital £1000 in £1 shares. Manufacturers of chemicals, dyes, tars, etc. Subscribers: R. Freeman; Dorothy Roberts. Registered office: 143 Cannon Street, London, E.C.4.

Vizilla Manufacturing Co., Ltd. (428,153).—Private company. Capital £1000 in 1000 shares of £1 each. Manufacturers of chemicals, gases, drugs, etc. Directors: R. and M. Stephenson. Registered office: 24, Elden Square, Newcastle-on-Tyne.

Frelands, Ltd. (430,966).—Private company. Capital £100 in £1 shares. Manufacturers of chemicals, oils, paints, etc. Directors: E. Landesman and Mrs. F. Landesman. Registered office: 47a Carnaby Street, Regent Street, London, W.1.

Alstons Surgical Co., Ltd. (429,965).—Private company. Capital £500 in 500 shares of £1 each. Manufacturers of chemicals, drugs, fertilisers, etc. Directors: Thomas, Mary, Moira, Arthur and Alice Alston. Registered office: 17 Gildredge Road, Eastbourne.

Smith, Parrall, Ltd. (430,558).—Private company. Capital £1000 in 500 7 per cent cumulative preference shares of £1 and 10,000 ordinary shares of 1s. each. Manufacturers of fertilisers, etc. Directors: Mary Smith, Queenie Parrall, and Winifred Allen. Registered office: 17 Dunstable Road, Luton.

Harlow Oils and Chemicals, Ltd. (429,039). Private company. Capital £1000 in 1000 shares of £1 each. Oil distillers, refiners, blenders, importers, exporters and manufacturers of and dealers in oils, etc. Directors: W. Baldwin, V. Forrester. Registered office. London Road, Harlow, Essex.

Arden Rubber, Ltd. (430,784).—Private company. Capital £2000 in £1 shares. Manufacturers of articles from latex rubber plastic or other chemical compounds (other than medicines), etc. Directors: G. and Marjorie Hinman. Registered office: 17 Victoria Street, London, S.W.1.

S. Margison, Ltd. (429,950).—Private company. Capital £5000 in 5000 shares of £1 each. Importers, exporters, manufacturers of dyes, dyestuffs, chemicals, etc. Directors: Sidney and Helena Margison. Registered office: 11 Peter Street, Manchester, 2.

Stanfil, Ltd. (431,031).—Private company. Capital £100 in £1 shares. Manufacturers of chemicals, fillers and compounds for the rubber, paint, chemical and allied industries, etc. Directors: H. Brown, A. Campbell, H. Brown. Solicitors: Boardman Barritt Styler & Holt, Manchester.

Botan, Ltd. (429,595).—Private company. Capital £5000 in £1 shares. To acquire the right to make and sell a boiler-cleaning compound known as "Botan Boiler Compound." Directors: Wm. and Newton Bacon. Registered office: Sivewright Bacon and Co., Ship Canal House, King Street, Manchester, 2.

Chemical and Allied Stocks and Shares

WITH buyers apparently adopting a waiting attitude until after the Budget, stock markets have had an easier appearance though no heavy selling developed. British Funds, particularly 2½ per cent Consols and 2½ per cent Treasury Bonds, moved back sharply and appeared sensitive to relatively moderate selling, the impression prevailing that the Budget may provide some indication of Mr. Dalton's intentions in regard to the "cheap money" policy.

With few exceptions shares of chemical and kindred companies were little changed on balance. Latest big development projects and expectations of more to come had a favourable influence on the iron and steel section, which provided a number of firm features, while colliery shares have been in quiet demand on break up value estimates. Oil shares eased after coming into demand on the latest indication of the intention of the U.S. to increase its political influence in the Near East. Shell were also helped

by news of the group's latest developments.

Imperial Chemical at 44s. 4½d. have been relatively steady, helped by market talk of a possible increase in the dividend, which for some years now has been limited to 8 per cent. Fisons changed hands around 63s. 3d., but B. Laporte eased to 95s. though the shares remained firmly held, as did W. J. Bush ordinary, which were at 92s. 6d. General Refractories (24s. 7½d.) became easier on profit taking following the financial results, but Goodlass Wall strengthened to 32s., while among other paint shares Pinchin Johnson showed firmness at 55s. 9d. on higher dividend hopes. Low Temperature Carbonisation 2s. ordinary were active and rose further to 6s. 3d. Associated Cement have eased to 63s. 3d., and British Plaster Board were 32s. 9d. United Molasses eased to 55s. 3d., but the units of the Distillers Co. strengthened to 135s. 6d. on the group's latest plastics developments, while Lansil ordinary and deferred shares improved to 36s. 6d. and 9s. 3d. respectively. Following the results and higher dividend, British Xylonite were quoted at £7¼.

Still helped by the company's big expansion plans, Stewarts & Lloyds touched 60s. Baldwins (Holdings) 4s. shares were higher at 7s. 9d.; Staveley were 60s. 3d.; Shipley 46s. 6d.; Dorman Long 28s. 4½d.; United Steel 26s. 6d.; and Colviles 25s. 9d., the latter attracting attention on yield considerations. The unchanged Bradford Dyers dividend (again 5 per cent) tended to make for caution in textile shares, though the company's profits are again higher and the allocation to reserve is doubled. Courtaulds eased to 52s. 6d. though the dividend created a satisfactory impression. In view of the change in the company's financial year this payment is described as a second interim; there is a possibility of a small final dividend.

Beechams deferred at 28s. failed to hold a moderate gain which followed the interim dividend announcements. Sangers were 34s., and Timothy Whites 48s. 6d. Elsewhere, Greeff-Chemicals Holdings 5s. shares were 13s. 6d., and Monsanto Chemicals 5½ per cent preference 23s. xd. William Blythe 3s. shares have changed hands at 16s. 6d. In other directions Chinnor Cement shares rose 8s. 9d. to 56s. 3d. on the doubled dividend.

British Chemical Prices

Market Reports

REPORTS from most sections of the industrial chemicals market indicate that the general position with regard to supplies and prices is practically unchanged. There has been a good flow of orders for shipment, with a considerable volume unplaced as yet owing to supply conditions. Almost any small available parcel is finding a ready outlet and the undertone is strong. The demand for coal-tar products continues to be greater than output and there has been some curtailment in the quantities permitted for export.

MANCHESTER.—Very strong price conditions rule throughout the Manchester chemical market and the supply position in respect of a number of light and heavy products, in spite of the effect of the fuel shortage on the consuming industries, especially in the textile section, is anything but comfortable. On the whole, the past week has witnessed steady pressure for supplies of the alkalis and other "bread-and-butter" lines, and both inquiry and fresh bookings since the last report have been on a fair scale. In the fertiliser trade there is marked anxiety to get in supplies of several descriptions, deliveries of which have been seriously interrupted during the past month or so, while a steady demand for most classes of tar products, both light and heavy, has been reported.

GLASGOW.—The Scottish heavy chemical trade suffered greatly again this week owing to road conditions, some towns being inaccessible. Simultaneously, deliveries from works in the south have been held up. Orders have been well up to standard, though in most cases deliveries are very slow. Prices show every sign of remaining firm or even increasing. Export orders were well maintained, prices also remaining firm in these markets or, if anything, being likely to increase.

Boys' Hostels Association

Mr. Oliver Lyttelton, M.P., a former President of the Board of Trade, will speak at the annual dinner of the Boys' Hostels Association to be held at Grosvenor House, London, on April 23. Lord Portal of Laverstoke will take the chair, and will be supported by Viscount Leverhulme and Sir Ernest Benn.

The Boys' Hostels Association maintains two residential hostels for working boys in London—the John Benn Hostel, Stepney, where 80 boys are now living, and King George's House, Stockwell, which has accommodation for another 200 boys but is awaiting repair from heavy air raid damage. Acting up to their motto "No Pains, No Gains," the boys themselves contributed over £3800 from their earnings towards the cost of running the hostels. The acute housing shortage has made the work of the Association more than ever necessary, nearly 80 per cent of the boys in its care being orphans or having no homes because their parents are separated. Tickets for the dinner on April 23 (price one guinea each) may be obtained from Mr. John Benn, Bouverie House, Fleet Street, E.C.4.

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Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each. Numbers given under "Applications for Patents" are for reference in all correspondence up to acceptance of the complete specification.

Complete Specifications Open to Public Inspection

Artificial resins.—E. I. du Pont de Nemours & Co. July 9, 1945. 19450/46.

New compositions containing water-insoluble organic polymers and water-soluble organic polymers.—E. I. du Pont de Nemours & Co. July 9, 1945. 20303/46.

Electrodeposition of metals.—E. I. du Pont de Nemours & Co. July 9, 1945. 20465/46.

Spinning of artificial filaments.—E. I. du Pont de Nemours & Co. July 12, 1945. 20877/4.

Phthalocyanine polyhydroxyalkylsulfonamides.—General Aniline & Film Corporation. July 11, 1945. 19806/46.

Phthalocyanine heterocyclicsulfonamides. General Aniline & Film Corporation. July 11, 1945. 19807/46.

Phthalocyanine sulfonhydrazides.—General Aniline & Film Corporation. July 11, 1945. 19803/46.

Coated fabrics and coating compositions therefor.—Imperial Chemical Industries, Ltd. January 26, 1944. 2072/45.

Oxygen-free copper.—International Smelting & Refining Co. July 11, 1945. 7557/46.

Boron-copper alloys.—International Smelting & Refining Co. July 11, 1945. 7731/46.

Substituted ammonium thiocyanates.—Koppers Co., Inc. July 11, 1945. 20642/46.

Derivatives of ethyl naphthalene.—Koppers Co., Inc. July 13, 1945. 20643/46.

2-alkyloxy- or alkenyloxy-5-nitro anilines and their salts.—Naamlooze Vennootschap Polak & Schwarz's Essencefabrieken. July 11, 1945. 18844/46.

Vulcanisation of natural and synthetic rubbers.—Ridbo Laboratories, Inc. July 10, 1945. 20457/46.

Chemotherapeutic compositions.—Westbury Chemical Co., Inc. July 13, 1945. 20596/46.

Hardenable compositions containing aminotriazine-aldehyde resins.—American Cyanamid Co. October 5, 1943. 7624/44.

Resins.—American Cyanamid Co. January 17, 1945. 8551/46.

Derivatives of amides.—Ciba, Ltd. July 16, 1945. 20161/46.

Printing fibrous sheet materials.—Ciba, Ltd. July 18, 1945. 20319/46.

Hardenable binding agent in a stable aqueous form.—Ciba, Ltd. July 17, 1945. 20900/46.

Colouring fibrous materials with the aid of pigments.—Ciba, Ltd. July 19, 1945. 20901/46.

Isomerising butane.—Compagnie Francaise de Raffinage. July 17, 1945. 21169/46.

Destructive distillation in retort furnaces. D. Dalin, T. J. Hedback, C. J. Gejrot, and A. W. Johansson. July 17, 1945. 21148/46.

Catalytic polymerisation of ethylene.—E. I. du Pont de Nemours & Co. July 18, 1945. 21515/46.

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Only applicants who hold an Honours Degree in Chemistry, or the equivalent, will be considered.
The commencing salary will depend on the qualifications and experience of the successful applicant, but will not be less than £700 per annum.

(*b*) **Station Chemist.**—Applicants must be capable of direct supervision of laboratory and staff in a power station, and experience on the lines mentioned in (*a*) is desirable. Only applicants who holds an Honours Degree in Chemistry, or the equivalent, will be considered. Salary will be in a scale proceeding to a maximum of £660 per annum by increments of £20 and the commencing rate will depend on the qualifications and experience of the successful applicant.

(*c*) **Assistant Chemists.**—Applicants must be capable of carrying out, under supervision, the normal work associated with the laboratory in a power station.
As a minimum qualification applicants must hold a Degree in Chemistry, or its equivalent. Salary will be in a scale proceeding to a maximum of £500 per annum by increments of £20 and the commencing rate will depend on the qualifications and experience of the successful applicant.

An emergency bonus of 16s. per week is at present paid in addition to the above-mentioned salaries.

Appointment will be subject to passing a medical examination and successful candidates will be required to join the Board's Superannuation Scheme, subject to acceptance by the Committee.

Applications, indicating age, qualifications (in the case of holders of a university degree, state whether Honours or Pass and if Physics included), particulars of training and experience, and accompanied by relevant testimonials, should reach the undersigned not later than the 29th March, 1947.

PATRICK J. DEMPSEY,
Secretary.

Electricity Supply Board,
62, Upper Mount Street, Dublin.
28th February, 1947.

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JUNIOR Laboratory Assistant wanted for our Swanley Works. Should have some experience and knowledge of Chemistry. Higher School Certificate or B.Sc. (Int.) an advantage. Apply Box No. 2433, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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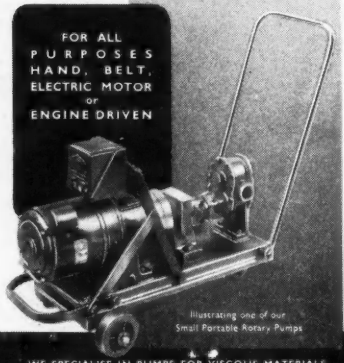

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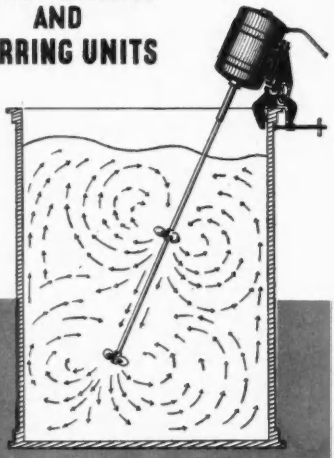

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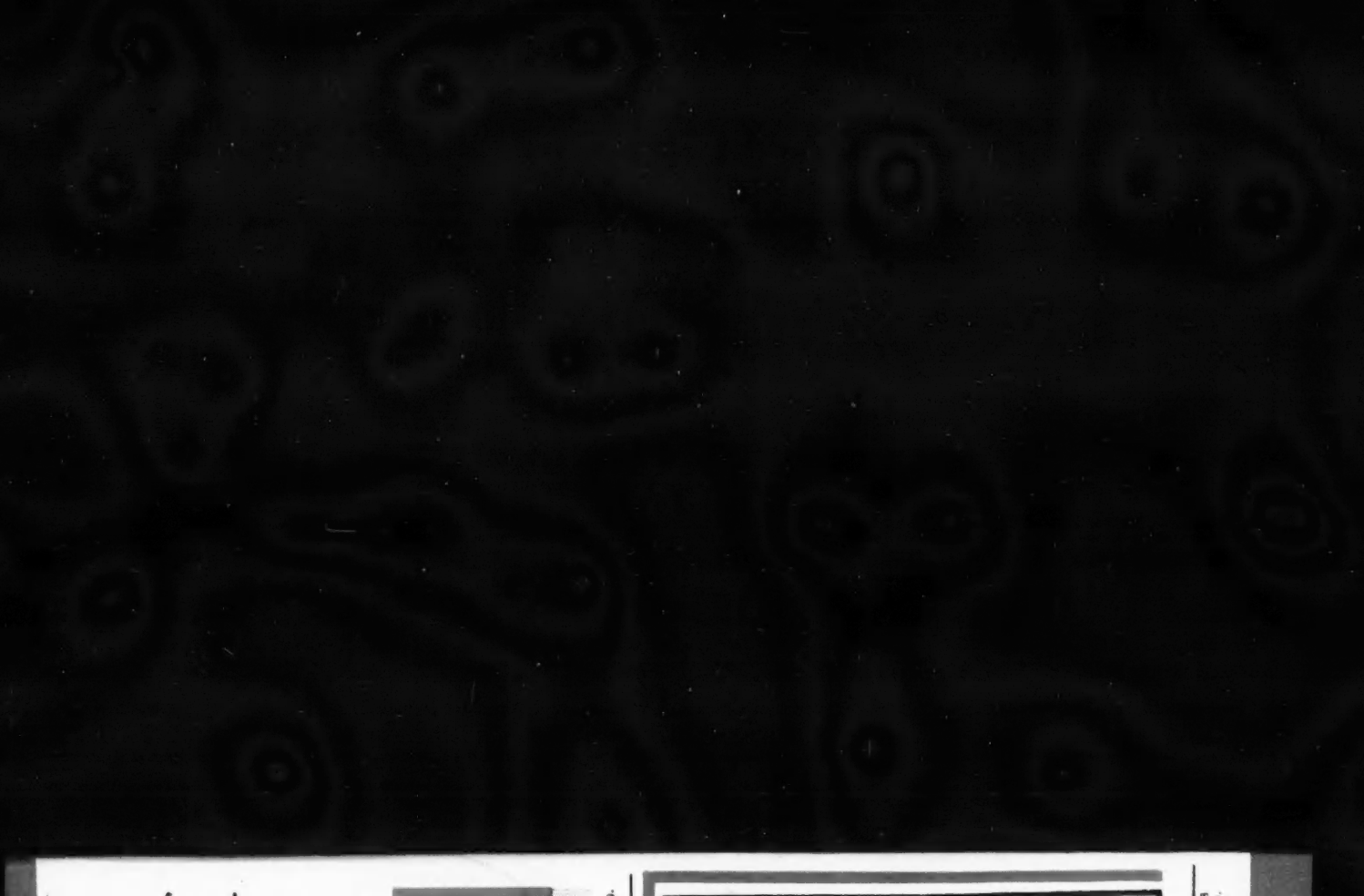
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